User Guide

Fiber Optic Extenders

PowerCage FOX Tx/Rx VGA
PowerCage FOX Tx/Rx DVI
PowerCage FOX Tx/Rx DVI Plus

High Resolution Fiber Optic Transmitters and Receivers

Extron® Electronics
INTERFACING, SWITCHING AND CONTROL

68-1911-01 Rev. C
01 11

Safety Instructions • English

This symbol is intended to alert the user of important operating and maintenance (servicing) instructions in the literature provided with the equipment.

This symbol is intended to alert the user of the presence of uninsulated dangerous voltage within the product's enclosure that may present a risk of electric shock.

Caution

Read Instructions • Read and understand all safety and operating instructions before using the equipment.

Retain Instructions • The safety instructions should be kept for future reference.

Follow Warnings • Follow all warnings and instructions marked on the equipment or in the user information.

Avoid Attachments • Do not use tools or attachments that are not recommended by the equipment manufacturer because they may be hazardous.

Warning

Power sources • This equipment should be operated only from the power source indicated on the product. This equipment is intended to be used with a main power system with a grounded (neutral) conductor. The third (grounding) pin is a safety feature, do not attempt to bypass or disable it.

Power disconnection • To remove power from the equipment safely, remove all power cords from the rear of the equipment, or the desktop power module (if detachable), or from the power source receptacle (wall plug).

Power cord protection • Power cords should be routed so that they are not likely to be stepped on or pinched by items placed upon or against them.

Servicing • Refer all servicing to qualified service personnel. There are no user-serviceable parts inside. To prevent the risk of shock, do not attempt to service this equipment yourself because opening or removing covers may expose you to dangerous voltage or other hazards.

Slots and openings • If the equipment has slots or holes in the enclosure, these are provided to prevent overheating of sensitive components inside. These openings must never be blocked by other objects.

Lithium battery • There is a danger of explosion if battery is incorrectly replaced. Replace it only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Consignes de Sécurité • Français

Ce symbole sert à avertir l'utilisateur que la documentation fournie avec le matériel contient des instructions importantes concernant l'exploitation et la maintenance (réparation).

Ce symbole sert à avertir l'utilisateur de la présence dans le boîtier de l'appareil de tensions dangereuses non isolées posant des risques d'électrocution.

Attention

Lire les instructions• Prendre connaissance de toutes les consignes de sécurité et d'exploitation avant d'utiliser le matériel.

Conserver les instructions• Ranger les consignes de sécurité afin de pouvoir les consulter à l'avenir.

Respecter les avertissements • Observer tous les avertissements et consignes marqués sur le matériel ou présentés dans la documentation utilisateur.

Eviter les pièces de fixation • Ne pas utiliser de pièces de fixation ni d'outils non recommandés par le fabricant du matériel car cela risquerait de poser certains dangers.

Avertissement

Alimentations • Ne faire fonctionner ce matériel qu'avec la source d'alimentation indiquée sur l'appareil. Ce matériel doit être utilisé avec une alimentation principale comportant un fil de terre (neutre). Le troisième contact (de mise à la terre) constitue un dispositif de sécurité : n'essayez pas de la contourner ni de la désactiver.

Déconnexion de l'alimentation• Pour mettre le matériel hors tension sans danger, déconnectez tous les cordons d'alimentation de l'arrière de l'appareil ou du module d'alimentation de bureau (s'il est amovible) ou encore de la prise secteur.

Protection du cordon d'alimentation • Acheminer les cordons d'alimentation de manière à ce que personne ne risque de marcher dessus et à ce qu'ils ne soient pas écrasés ou pincés par des objets.

Réparation-maintenance • Faire exécuter toutes les interventions de réparation-maintenance par un technicien qualifié. Aucun des éléments internes ne peut être réparé par l'utilisateur. Afin d'éviter tout danger d'électrocution, l'utilisateur ne doit pas essayer de procéder lui-même à ces opérations car l'ouverture ou le retrait des couvercles risquent de l'exposer à de hautes tensions et autres dangers.

Fentes et orifices • Si le boîtier de l'appareil comporte des fentes ou des orifices, ceux-ci servent à empêcher les composants internes sensibles de surchauffer. Ces ouvertures ne doivent jamais être bloquées par des objets.

Lithium Batterie • Il a danger d'explosion s'll y a remplacment incorrect de la batterie. Remplacer uniquement avec une batterie du meme type ou d'un ype equivalent recommande par le constructeur. Mettre au reut les batteries usagees conformement aux instructions du fabricant.

Sicherheitsanleitungen • Deutsch

Dieses Symbol soll dem Benutzer in der im Lieferumfang enthaltenen Dokumentation besonders wichtige Hinweise zur Bedienung und Wartung (Instandhaltung) geben.

Dieses Symbol soll den Benutzer darauf aufmerksam machen, daß im Inneren des Gehäuses dieses Produktes gefährliche Spannungen, die nicht isoliert sind und die einen elektrischen Schock verursachen können, herrschen.

Achtung

Lesen der Anleitungen • Bevor Sie das Gerät zum ersten Mal verwenden, sollten Sie alle Sicherheits-und Bedienungsanleitungen genau durchlesen und verstehen.

Aufbewahren der Anleitungen • Die Hinweise zur elektrischen Sicherheit des Produktes sollten Sie aufbewahren, damit Sie im Bedarfsfall darauf zurückgreifen können.

Befolgen der Warnhinweise • Befolgen Sie alle Warnhinweise und Anleitungen auf dem Gerät oder in der Benutzerdokumentation.

Keine Zusatzgeräte • Verwenden Sie keine Werkzeuge oder Zusatzgeräte, die nicht ausdrücklich vom Hersteller empfohlen wurden, da diese eine Gefahrenquelle darstellen können.

Vorsicht

Stromquellen • Dieses Gerät sollte nur über die auf dem Produkt angegebene Stromquelle betrieben werden. Dieses Gerät wurde für eine Verwendung mit einer Hauptstromleitung mit einem geerdeten (neutralen) Leiter konzipiert. Der dritte Kontakt ist für einen Erdanschluß, und stellt eine Sicherheitsfunktion dar. Diese sollte nicht umgangen oder außer Betrieb gesetzt werden.

Stromunterbrechung • Um das Gerät auf sichere Weise vom Netz zu trennen, sollten Sie alle Netzkabel aus der Rückseite des Gerätes, aus der externen Stomversorgung (falls dies möglich ist) oder aus der Wandsteckdose ziehen.

Schutz des Netzkabels • Netzkabel sollten stets so verlegt werden, daß sie nicht im Weg liegen und niemand darauf treten kann oder Objekte darauf- oder unmittelbar dagegengestellt werden können.

Wartung • Alle Wartungsmaßnahmen sollten nur von qualifiziertem Servicepersonal durchgeführt werden. Die internen Komponenten des Gerätes sind wartungsfrei. Zur Vermeidung eines elektrischen Schocks versuchen Sie in keinem Fall, dieses Gerät selbst öffnen, da beim Entfernen der Abdeckungen die Gefahr eines elektrischen Schlags und/oder andere Gefahren bestehen.

Schlitze und Öffnungen • Wenn das Gerät Schlitze oder Löcher im Gehäuse aufweist, dienen diese zur Vermeidung einer Überhitzung der empfindlichen Teile im Inneren. Diese Öffnungen dürfen niemals von anderen Objekten blockiert werden.

Litium-Batterie • Explosionsgefahr, falls die Batterie nicht richtig ersetzt wird. Ersetzen Sie verbrauchte Batterien nur durch den gleichen oder einen vergleichbaren Batterietyp, der auch vom Hersteller empfohlen wird. Entsorgen Sie verbrauchte Batterien bitte gemäß den Herstelleranweisungen.

Instrucciones de seguridad • Español

Este símbolo se utiliza para advertir al usuario sobre instrucciones importantes de operación y mantenimiento (o cambio de partes) que se desean destacar en el contenido de la documentación suministrada con los equipos.

Este símbolo se utiliza para advertir al usuario sobre la presencia de elementos con voltaje peligroso sin protección aislante, que puedan encontrarse dentro de la caja o alojamiento del producto, y que puedan representar riesgo de electrocución.

Precaucion

Leer las instrucciones • Leer y analizar todas las instrucciones de operación y seguridad, antes de usar el equipo.

Conservar las instrucciones • Conservar las instrucciones de seguridad para futura consulta.

Obedecer las advertencias • Todas las advertencias e instrucciones marcadas en el equipo o en la documentación del usuario, deben ser obedecidas.

Evitar el uso de accesorios • No usar herramientas o accesorios que no sean especificamente recomendados por el fabricante, ya que podrian implicar riesgos.

Advertencia

Alimentación eléctrica • Este equipo debe conectarse únicamente a la fuente/tipo de alimentación eléctrica indicada en el mismo. La alimentación eléctrica de este equipo debe provenir de un sistema de distribución general con conductor neutro a tierra. La tercera pata (puesta a tierra) es una medida de seguridad, no puentearia ni eliminaria.

Desconexión de alimentación eléctrica • Para desconectar con seguridad la acometida de alimentación eléctrica al equipo, desenchufar todos los cables de alimentación en el panel trasero del equipo, o desenchufar el módulo de alimentación (si fuera independiente), o desenchufar el cable del receptáculo de la pared.

Protección del cables de alimentación • Los cables de alimentación eléctrica se deben instalar en lugares donde no sean pisados ni apretados por objetos que se puedan apoyar sobre ellos.

Reparaciones/mantenimiento • Solicitar siempre los servicios técnicos de personal calificado. En el interior no hay partes a las que el usuario deba acceder. Para evitar riesgo de electrocución, no intentar personalmente la reparación/mantenimiento de este equipo, ya que al abrir o extraer las tapas puede quedar expuesto a voltajes peligrosos u otros riesgos.

Ranuras y aberturas • Si el equipo posee ranuras o orificios en su caja/alojamiento, es para evitar el sobrecalientamiento de componentes internos sensibles. Estas aberturas nunca se deben obstruir con otros objetos.

Batería de litio • Existe riesgo de explosión si esta batería se coloca en la posición incorrecta. Cambiar esta batería únicamente con el mismo tipo (o su equivalente) recomendado por el fabricante. Desachar las baterías usadas siguiendo las instrucciones del fabricante.

安全须知 • 中文

这个符号提示用户该设备用户手册中有重要的操作和维护说明。

这个符号警告用户该设备机壳内有暴露的危险电压，有触电危险。

注意

阅读说明书 • 用户使用该设备前必须阅读并理解所有安全和使用说明。

保存说明书 • 用户应保存安全说明书以备将来使用。

遵守警告 • 用户应遵守产品和用户指南上的所有安全和操作说明。

避免追加 • 不要使用该产品厂商没有推荐的工具或追加设备，以避免危险。

警告

电源 • 该设备只能使用产品上标明的电源。 设备必须使用有地线的供电系统供电。 第三条线（地线）是安全设施，不能不用或跳过 。

拔掉电源 • 为安全地从设备拔掉电源，请拔掉所有设备后或桌面电源的电源线，或任何接到市电系统的电源线。

电源线保护 • 妥善布线， 避免被踩踏，或重物挤压。

维护 • 所有维修必须由认证的维修人员进行。 设备内部没有用户可以更换的零件。为避免出现触电危险不要自己试图打开设备盖子维修该设备。

通风孔 • 有些设备机壳上有通风槽或孔，它们是用来防止机内敏感元件过热。 不要用任何东西挡住通风孔。

锂电池 • 不正确的更换电池会有爆炸的危险。必须使用与厂家推荐的相同或相近型号的电池。按照生产厂的建议处理废弃电池。

FCC Class A Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

The Class A limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

NOTE: This unit was tested with shielded cables on the peripheral devices. Shielded cables must be used with the unit to ensure compliance with FCC emissions limits.

For more information on safety guidelines, regulatory compliances, EMI/EMF compliance, accessibility, and related topics, **click here**.

Notational Conventions Used in this Guide

TIP: A tip provides a suggestion to make setting up or working with the device easier.

NOTE: A note draws attention to important information.

CAUTION: A caution warns of things or actions that might damage the equipment.

WARNING: A warning warns of things or actions that might cause injury, death, or other severe consequences.

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Introduction

WARNING: The PowerCage™ FOX Tx/Rx units output continuous invisible light, which may be harmful to the eyes; use with caution.

- ***Do not look*** into the rear panel fiber optic cable connectors or into the fiber optic cables themselves.
- Plug the attached dust caps into the optical transceivers when the fiber optic cable is unplugged.

- About this Manual
- About the PowerCage FOX Transmitters and Receivers
- Features

About this Manual

This guide contains information about the following Extron® PowerCage FOX family of modular board-designed fiber optic transmitters and receivers for the PowerCage Modular Power Enclosures:

- **PowerCage FOX Tx VGA transmitter**
- **PowerCage FOX Rx VGA receiver**:
- **PowerCage FOX Tx DVI (non-Plus) transmitter**
- **PowerCage FOX Rx DVI (non-Plus) receiver**
- **PowerCage FOX Tx DVI Plus transmitter**
- **PowerCage FOX Rx DVI Plus receiver**

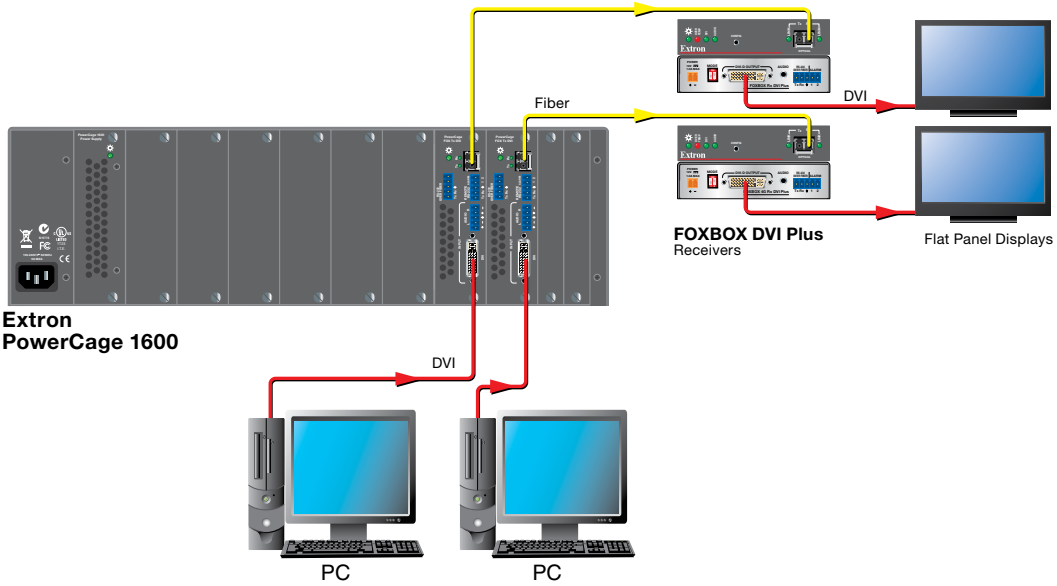


Figure 1. Typical PowerCage FOX Tx/Rx Application

This guide includes instructions for an experienced installer to install, configure, and operate the equipment.

NOTES:
- In this manual, the term "PowerCage FOX" refers to either an analog RGB video or a DVI video unit. Where differences exist between the VGA and DVI models, the full name of the unit is used.
- In this manual, the term "PowerCage FOX DVI" refers to either the Plus or non-Plus model, unless a model is specifically named.

About the PowerCage FOX Transmitters and Receivers

The PowerCage consists of several sets of ultra-high performance fiber optic transmitters and receivers:

- **PowerCage FOX Tx VGA transmitter —** Accepts an analog RGB video input, an audio input, and an RS-232 serial input and outputs a proprietary optical signal on an LC connector to a PowerCage FOX, FOXBOX, or FOX 500 receiver. It also can receive a proprietary optical signal from the receiver consisting of the RS-232 return from a controlled device.
- **PowerCage FOX Rx VGA receiver —** Accepts a proprietary optical signal on an LC connector from a PowerCage FOX, FOXBOX, or FOX 500 transmitter or daisy-chained PowerCage FOX or PowerCage FOX receiver and outputs analog RGB video, audio, and RS-232 serial commands. It also can either:
  - Receive an RS-232 return from a controlled device and send it to the transmitter via a proprietary optical signal, or
  - Output a daisy-chained signal to another receiver.
- **PowerCage FOX Tx DVI Plus transmitter —** Accepts a single link of DVI video input (up to 1920 x 1200 at 60 Hz), an audio input, and an RS-232 serial input and outputs a proprietary optical signal on an LC connector to a PowerCage FOX Rx DVI Plus or FOXBOX Rx DVI Plus receiver only. It also can receive a proprietary optical signal from the receiver consisting of the RS-232 return from a controlled device.
- **PowerCage FOX Tx DVI (non-Plus) transmitter —** Similar to PowerCage FOX TX DVI Plus, but with a lower maximum resolution (1600x1200 or 1080p @ 60 Hz) and a different proprietary output that is compatible with all PowerCage FOX, FOXBOX, or FOX 500 receivers.
- **PowerCage FOX Rx DVI Plus receiver —** Accepts a proprietary optical signal on an LC connector from a PowerCage FOX, FOXBOX, or FOX 500 transmitter or daisy-chained receiver and outputs a single link of DVI video, audio, and RS-232 serial commands. It also can either:
  - Receive an RS-232 return from a controlled device and send it to the transmitter via a proprietary optical signal.
  - Output a daisy-chained signal to another receiver.
- **PowerCage FOX Rx DVI (non-Plus) receiver —** Similar to the PowerCage FOX RX DVI Plus, but with lower maximum resolution (1600x1200 or 1080p @ 60 Hz) and receiving a different proprietary input. Discontinued, but included in this list for reference only.

General System Operation

The PowerCage FOX VGA transmitter inputs VGA-UXGA RGB video.

The PowerCage FOX DVI Plus transmitter inputs a single link of DVI video.

Both transmitters input audio and one-way (transmitter-to-receiver) RS-232 serial communication (for applications such as projector control). The transmitters convert all of the inputs to them into a proprietary signal and output the signal on a single fiber optic cable to the receiver. An optional return (receiver-to-transmitter) stream of serial RS-232 communications, such as projector responses, requires a second fiber optic cable. Rather than the return RS-232 communications, the receivers can be configured to output a daisy-chained primary fiber optic signal to another receiver.

The PowerCage FOX VGA receiver outputs VGA-UXGA RGB video.

The PowerCage FOX DVI receiver outputs a single link of DVI video.

The receivers convert the proprietary signal back to video (either RGB or DVI as applicable to the model), audio, and serial RS-232 communication and output the signals locally. If either RS-232 return or daisy-chained communications are implemented (a second fiber optic cable is installed), the receiver outputs a proprietary signal on the second fiber optic cable. For video resolutions up to 1600 x 1200 or 1080p, the video output of the receiver is a perfect, pixel-for-pixel recreation of the video signal input to the transmitter.

The PowerCage FOX VGA transmitter can handle an RGBHV, RGBS, RGsB, or RsGsBs input signal. The PowerCage FOX VGA receiver can output RGBHV or RGsB, as selected by the user.

The transmitter and receiver have image and audio adjustments available under RS-232 control. Both units have fiber light status indicators and lost-light alarm connectors.

The receivers have built-in alternating pixels, Color Bars, and grayscale test patterns to assist in setting up the display equipment.

System Compatibility

The fiber optic signal output from a PowerCage FOX Tx DVI Plus transmitter can be received only by a PowerCage FOX Rx DVI Plus or FOXBOX Rx DVI Plus receiver.

The fiber optic signals from all other units are interchangeably compatible between VGA and DVI units, Plus and non-Plus units, and PowerCage FOX, FOXBOX, and FOX 500 units as shown in the following table.

Receiver	Compatible transmitters
PowerCage FOX Rx VGA	PowerCage FOX Tx VGA
	PowerCage FOX Tx DVI (non-Plus)
	FOXBOX Tx VGA
	FOXBOX Tx DVI (non-Plus)
	FOX 500 Tx (VGA)
	FOX 500 Tx DVI
	FOX 500 DA6
PowerCage FOX Rx DVI Plus	PowerCage FOX Tx DVI Plus
	PowerCage Tx DVI (non-Plus)
	PowerCage FOX Tx VGA
	FOXBOX Tx DVI Plus
	FOXBOX Tx DVI (non-Plus)
	FOXBOX Tx VGA
	FOX 500 Tx (VGA)
	FOX 500 Tx DVI
	FOX 500 DA6
PowerCage FOX Rx DVI (non Plus)	PowerCage FOX Tx DVI (non-Plus)
	PowerCage FOX Tx VGA
	FOXBOX Tx DVI (non-Plus)
	FOXBOX Tx VGA
	FOX 500 Tx (VGA)
	FOX 500 Tx DVI
	FOX 500 DA6

NOTES:
- The PowerCage FOX units are fully compatible with all Extron PowerCage FOX, FOXBOX, and FOX 500 products and a variety of other fiber optic products. Those other products are identified where appropriate, but not specifically described in this manual.
- The PowerCage FOX DVI does not support the transmission of signals with High-bandwidth Digital Content Protection (HDCP).

Cable Transmission Modes

The transmitters and receivers are further categorized by the type of fiber optic cable, multimode or singlemode, which define the effective range of transmission:

- **Multimode —** Long distance, up to 2 km (6,560 feet) (depending on the fiber cable)
  - PowerCage FOX Tx VGA MM
  - PowerCage FOX Rx VGA MM
  - PowerCage FOX Tx DVI (Plus and non-Plus) MM
  - PowerCage FOX Rx DVI (Plus and non-Plus) MM
- **Singlemode —** Very long distance, up to 30 km (18.75 miles)
  - PowerCage FOX Tx VGA SM
  - PowerCage FOX Rx VGA SM
  - PowerCage FOX Tx DVI (Plus and non-Plus) SM
  - PowerCage FOX Rx DVI (Plus and non-Plus) SM

NOTE: The multimode and singlemode products are physically and functionally identical, with the exception of the effective range of transmission. In this manual, any reference applies to either transmission mode unless otherwise specified.

Features

Ultra high performance — Offers pixel-for-pixel RGBHV video or DVI video transmission, up to 1920 x 1200 at 60 Hz (PowerCage FOX DVI Plus models) or 1600 x 1200 at 60 Hz.

Video input —

PowerCage FOX VGA — The transmitter accepts RGBHV, RGBS, RGsB, or RsGsBs on a 15-pin HD connector.

PowerCage FOX DVI — The transmitter accepts a single link of DVI-D video on a DVI-I connector.

EDID emulation mode (PowerCage FOX Tx DVI only) — The PowerCage FOX DVI transmitter provides a function, under RS-232 control, for specifying the rate of the incoming DVI signal. EDID emulation mode allows proper operation when no local monitor is present.

Video output —

PowerCage FOX VGA — The receiver outputs RGBHV or RGsB (user-selectable) on a 15-pin HD connector.

PowerCage FOX DVI — The receiver outputs a single link of DVI-D video on a DVI-I connector.

PowerCage FOX VGA and PowerCage FOX DVI are mutually compatible — Enables ultra-long distance DVI-to-analog RGB and analog RGB-to-DVI conversion without the need for extra signal conversion devices.

Compatibility with FOX 500 DA6 distribution amplifier and Fiber Matrix 6400 matrix switcher

Audio input — The transmitters accept a balanced or unbalanced stereo audio input on a 3.5 mm, 5-pole captive screw terminal.

Audio input gain/attenuation — The input audio level can be adjusted within a range of -18 dB (attenuation) to +10 dB (gain) via the RS-232 link.

Audio output — The receivers output balanced or unbalanced stereo audio on a 3.5 mm, 5-pole captive screw terminal.

Links monitoring — The front panels of the transmitters and receivers have indicators for monitoring both fiber optic links.

Loss-of-light alarms — The rear panels of the transmitters and receivers have discrete outputs that indicate if either of the fiber optic links have suffered a loss of the light signal.

FOX Extender control program — For RS-232 remote control from a PC running Windows®, the Extron FOX Extender control software provides a graphical interface and drag-and-drop/point-and-click operation.

Simple Instruction Set (SIS™) — The transmitters and receivers use the SIS for easy remote control operation.

Audio level — The audio output can be set to either the consumer level (-10 dBV) or professional level (+4 dBu) from the front panel or under RS-232 control.

Upgradable firmware — The firmware that controls the operation of each unit can be upgraded in the field via the Configuration port on the PowerCage enclosure without taking the unit out of service. Firmware upgrades are available for download on the Extron website, **www.extron.com**, and they can be installed using the FOX Extender control program.

Memory presets — 30 memory presets are a time-saving feature that lets you store input size and position settings relative to a specific input resolution. You can then recall those settings, when needed, using the SIS or the control software.

PowerCage mounting — All PowerCage FOX Tx and Rx units are mountable in any Extron PowerCage enclosure.

Installation and Operation

This section describes the installation and operation of the PowerCage FOX VGA and PowerCage FOX DVI, including:

- **Mounting the Units**
- **Connections and Indications**
- **PowerCage Front Panel Port, Control, and Indicators**
- **Operation**

Mounting the Units

The PowerCage FOX transmitter or receiver must be installed in an Extron PowerCage enclosure (see "**Installing a Board in the Enclosure**" on page 42.)

Connections and Indications

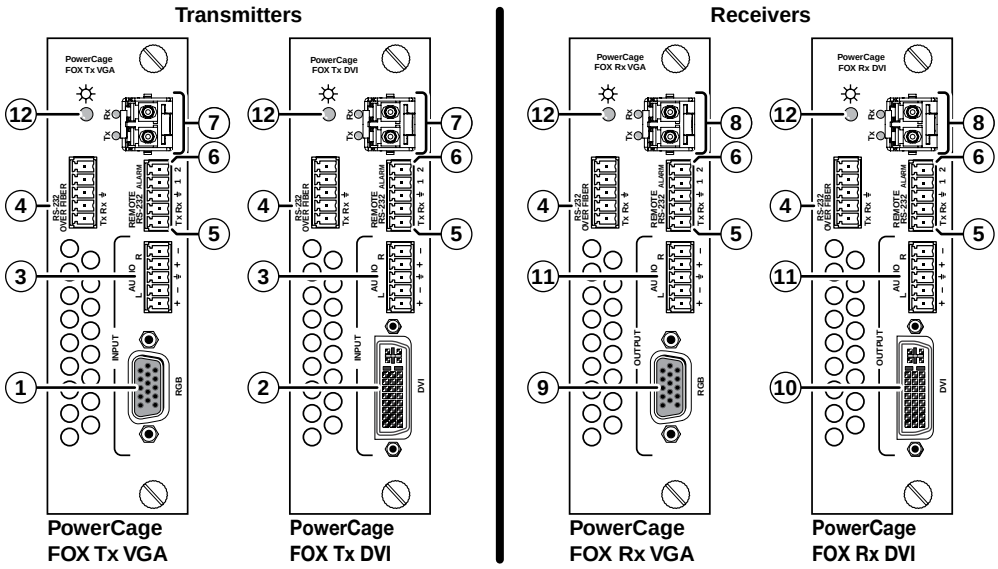


Figure 2. PowerCage FOX Tx Transmitter Connectors

① **VGA Input connectors (PowerCage FOX VGA only) —** Connect an analog VGA-UXGA RGB video source to this 15-pin HD female connector.

② **DVI-I Input connector (PowerCage FOX DVI only) —** Connect a single link of DVI-D to this DVI-I connector (see "**DVI connector (PowerCage FOX DVI)**" on page 12 for pin assignments.)

NOTE: The PowerCage FOX DVI accepts only the digital signals on the DVI-I Input connector. The analog pins on the port are not connected.

③ **Audio Input connector (transmitters) —** Connect a balanced or unbalanced stereo or mono audio input to this connector. The connector is included with transmitter, but you must supply the audio cable (see figure 3 to wire a captive screw connector for the appropriate input type and impedance level.) Use the supplied tie-wrap to strap the audio cable to the extended tail of the connector.

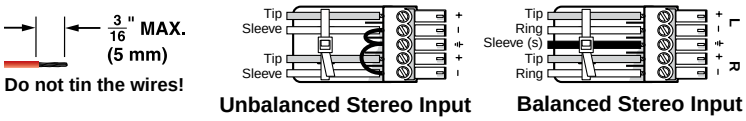


Figure 3. Captive Screw Connector Wiring for Stereo Audio Input

NOTES:
- The length of exposed wires is critical. The ideal length is 3/16 inch (5 mm).
  - If the stripped section of wire is longer than 3/16 inch, the exposed wires may touch, causing a short circuit.
  - If the stripped section of wire is shorter than 3/16 inch, wires can be easily pulled out even if tightly fastened by the captive screws.
- Figure 4 identifies the tip, ring, and sleeve. A mono audio connector consists of the tip and sleeve. A stereo audio connector consists of the tip, ring and sleeve. The tip, ring, and sleeve wires are also shown on the captive screw audio connector diagrams, figure 3, above, and **figure 7**.

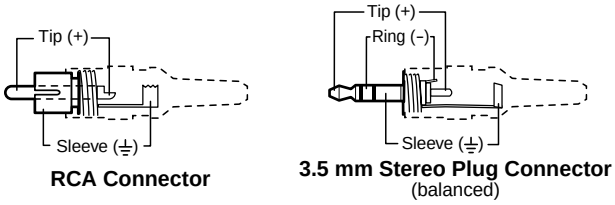
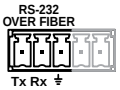


Figure 4. Typical Audio Connectors

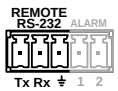
The input audio level can be set via RS-232 control (see the "**Remote Control**" section.)

④ **RS-232 Over Fiber port —** If you want the transmitter/receiver system to pass serial command signals between the transmitter and receiver, for serial control of a projector for example, connect the host device to the transmitter and the slave device to the receiver via the first three poles on the left (Tx, Rx, and ⏚) of these 5-pole captive screw connectors on **both** units (see "**RS-232 connections**" on page 13 to wire this connector.



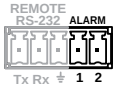
NOTES:
- If you connect only one fiber optic cable (**item** ⑦), or you configure the receiver for daisy-chaining, you will not receive reports from the controlled device. To receive responses from the controlled device, you must install two fiber optic cables and leave the receiver in normal mode (via an SIS command for the PowerCage FOX Rx receiver.)
- The PowerCage FOX can pass RS-232 commands and responses at rates up to 115200 baud.

⑤ **Remote RS-232 port —** For serial control of the transmitter and receiver, connect a host device, such as a computer, to **either** unit via three poles (Tx, Rx, and ⏚) of this 5-pole captive screw connector on **either** unit (see "**RS-232 connections**" on page 13 to wire this connector.)



See "**Remote Control**" for definitions of the SIS commands (serial commands to control the transmitter via this connector).

⑥ Alarm outputs port — For remote monitoring of the status of the Rx fiber optic link, connect a locally-constructed or furnished monitoring device to the unit to be monitored via two poles of this 5-pole captive screw connector on the unit to be monitored. When the unit does not detect light on its Rx connector, pin 1 and pin 2 of this port are shorted together.



⑦ Transmitter fiber optic connectors and LEDs —

WARNING: These units output continuous invisible light, which may be harmful to the eyes; use with caution. For additional safety, plug the attached dust caps into the optical transceivers when the fiber optic cable is unplugged.

NOTES:

- Ensure that you use the proper fiber cable for your transmitter/receiver pair. Typically, singlemode fiber has a yellow jacket and multimode cable has an orange or aqua jacket.
- Only one fiber optic cable, transmitter-Tx-to-receiver-Rx, is required for video, audio, and serial command transmission. But, if you connect only one fiber optic cable, or if your transmitter is configured to daisy-chain the optical signal, system functionality is reduced. You ***will not*** receive RS-232 reports from the controlled device, and some Windows-based control program functions and RS-232 commands ***will not*** work. To receive responses from the controlled device and for full functionality, you need to install both fiber optic cables and leave the receiver in normal mode (via an SIS command for the PowerCage FOX Rx receiver.)

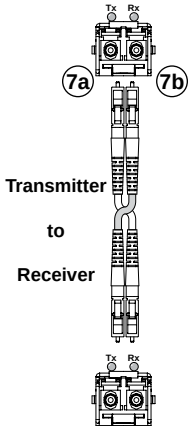
⑦a Tx (required) — For all one-way video, audio, and serial communications from the transmitter to the receiver, connect a fiber optic cable to the Tx LC connector.

Connect the free end of this fiber optic cable to the Rx connector (**item ⑧**) on the PowerCage FOX Rx receiver or to any other compatible Extron FOX device.

⑦b Rx (optional) — Connect a fiber optic cable for all one-way return serial communications from the receiver to the transmitter.

Connect the free end of this fiber optic cable to the Tx connector (**item ⑧**) on the PowerCage FOX Rx receiver in normal mode or to any other compatible Extron FOX device.

Tx and Rx LEDs — When lit, the link is active (light is received).



⑧ Receiver fiber optic connectors and LEDs —

WARNING: These units output continuous invisible light, which may be harmful to the eyes; use with caution. For additional safety, plug the attached dust caps into the optical transceivers when the fiber optic cable is unplugged.

NOTES:

- You can connect the transmitter to one or more receivers in one of three ways:
  - **One way (transmitter-Tx-to-receiver-Rx) only —** Connect fiber cable ⑧a (from transmitter connector ⑦a) **only**.
  - **Two way (transmitter to receiver and return) —** Connect fiber cable ⑧a (from transmitter connector ⑦a) and fiber cable ⑧b back to the transmitter (connector ⑦b) (see figure 5.)
  - **One way (transmitter to receiver) with daisy chain (receiver to receiver) —** Connect fiber cable ⑧a from a fiber optic source and cable ⑧b to the next receiver in the daisy chain (see figure 6.) Set each receiver in the daisy chain to daisy chain mode (via an **SIS command** for the PowerCage FOX Rx receiver.) Up to 10 properly-configured receivers can be connected in a daisy chain to a single transmitter.
- See the transmitter fiber connector **NOTES** on page 8, which also apply to these connectors.

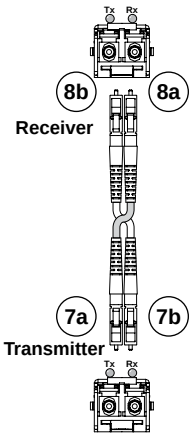


Figure 5. Two Way Configuration

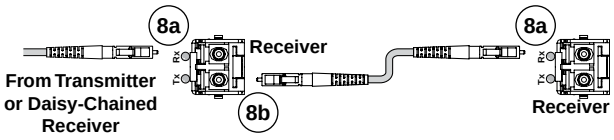


Figure 6. Daisy Chain Configuration

⑧a **Rx (required) —** For all one-way video, audio, and serial communications from the transmitter to the receiver, connect a fiber optic cable to the Rx LC connector.

Connect the free end of this fiber optic cable to the Tx connector on the PowerCage FOX Tx transmitter (**item** ⑦a on page 9) or to any other compatible Extron fiber optic device.

⑧b **Tx (optional) —** Connect a fiber optic cable to the Tx LC connector for either of the following functions:

Normal configuration — For all one-way return serial communications from the receiver to the Rx connector on the transmitter (see figure 5.)

Daisy chain configuration — For daisy-chained video, audio, and serial communications to the Rx connector on another receiver (see figure 6.)

NOTE: The Tx connector emits light in either case and the Rx port receives light.

Connect the free end of this fiber optic cable to either:

- The Rx connector on the PowerCage FOX Tx transmitter (**item** ⑦b on page 9) or to any other compatible Extron fiber optic device
- The Rx connector on another receiver in the daisy chain.

Tx and Rx LEDs — When lit, the link is active (light is received).

⑨ **VGA Output connector (PowerCage FOX Rx VGA only) —** Connect an analog VGA-UXGA RGB video display to this 15-pin HD female connector.

> **NOTE:** You can set the receiver to output the desired video format: RGBHV or RGsB. RGBHV is the default (see the "**Remote Control**"section.)

⑩ **DVI-I Output connector (PowerCage FOX DVI only) —** Connect a DVI video display to this DVI-I connector (see "**DVI connector (PowerCage FOX DVI)**" on page 12 for pin assignments.)

> **NOTE:** The PowerCage FOX DVI outputs only the digital signals on the DVI-I Output connector. The analog pins on the port are not connected.

⑪ **Audio output connector (receivers) —** This 5-pole, 3.5 mm captive screw connector outputs the transmitted, unamplified, line level audio. Connect audio devices, such as an audio amplifier or powered speakers.

See figure 7 to properly wire a captive screw output connector. Use the supplied tie-wrap to strap the audio cable to the extended tail of the connector.

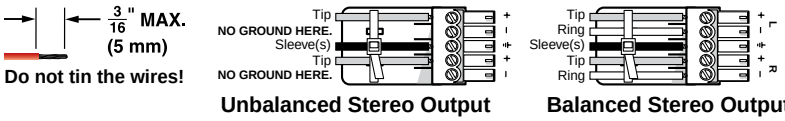


Figure 7. Captive Screw Connector Wiring for Stereo Audio Output

> **CAUTION:** For unbalanced audio, connect the sleeves to the ground contact. ***DO NOT*** connect the sleeves to the negative (-) contacts.

> **NOTES:** The length of exposed wires is critical. The ideal length is 3/16 inch (5 mm) (see the audio input connector **NOTES** on page 8 for more information.)

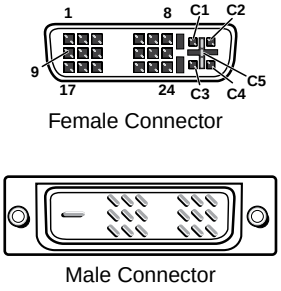
The volume level for the output can be set to either the consumer line level (-10 dBV) or the professional line level (+4 dBu) via RS-232 control (see the "**Remote Control**" section for details.)

⑫ **Power LED —** This LED lights to indicate that power is applied to the unit.

Making Connections

DVI connector (PowerCage FOX DVI)

Figure 8 defines the DVI pin assignments.



Pin	Signal	Pin	Signal	Pin	Signal
1	TMDS data 2–	9	TMDS data 1–	17	TMDS data 0–
2	TMDS data 2+	10	TMDS data 1+	18	TMDS data 0+
3	TMDS data 2 shield	11	TMDS data 1 shield	19	TMDS data 0 shield
4	Spare	12	Spare	20	Spare
5	Spare	13	Spare	21	Spare
6	DDC clock	14	+5 V power	22	
7	DDC data	15	Ground (+5 V)	23	TMDS clock+
8	No connection	16	Hot Plug Detect	24	TMDS clock–
C1	Analog Red Video	C3	Analog Blue Video	C5	Analog Ground
C2	Analog Green Video	C4	Analog H. Sync		

Figure 8. DVI Connectors

NOTE: The missing pins on the included DVI cable are not required for the single link of DVI-D data supported by the PowerCage FOX DVI. The analog video pins are not connected. All of these unused pins are shaded gray in the figure above.

DVI signals run at a very high frequency and are especially prone to errors caused by bad video connections, too many adapters, or excessive cable length. To avoid the loss of an image or jitter, follow these guidelines:

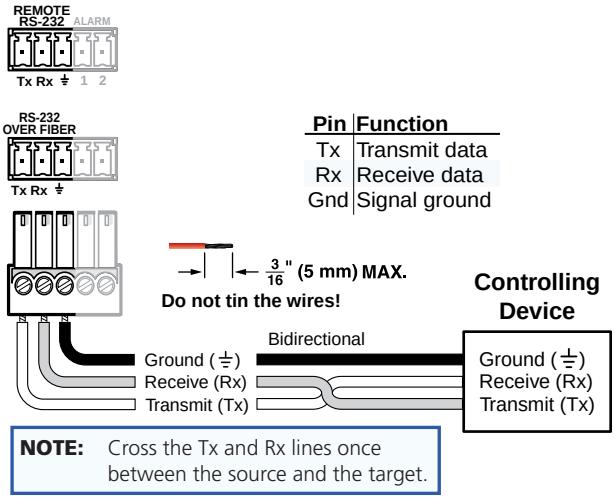
- Do not exceed 16.4 feet (5 meters) on the input or buffered loop-through of the PowerCage FOX DVI transmitter or the output of the PowerCage FOX DVI receiver.
- Use only the cable designed for DVI signals that is supplied by Extron.
- Limit or avoid the use of adapters.
- Use only cables specifically intended for DVI or HDMI® signals. Use of non-DVI or non-HDMI cables or modified cables can result in a missing video output.

RS-232 connections

The RS-232 Over Fiber port is for transmission of serial signals, such as projector control signals, between the transmitter and receiver.

The Remote RS-232 port is for remote control of the transmitter and receiver. The protocol for the Remote RS-232 port is as follows:

- 9600 baud
- 1 stop bit
- no parity
- no flow control
- 8 data bits



NOTE: Cross the Tx and Rx lines once between the source and the target.

Figure 9. RS-232 Over Fiber Connector

NOTES: The length of exposed wires is critical. The ideal length is 3/16 inch (5 mm) (see the audio input connector **NOTES** on page 8 for more information.)

Alarm outputs connection

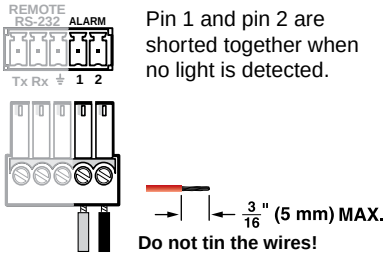


Figure 10. Alarm Connector

NOTES: The length of exposed wires is critical. The ideal length is 3/16 inch (5 mm) (see the audio input connector **NOTES** on page 8 for more information.)

PowerCage Front Panel Port, Control, and Indicators

The following features are on the front panel of the PowerCage enclosure.

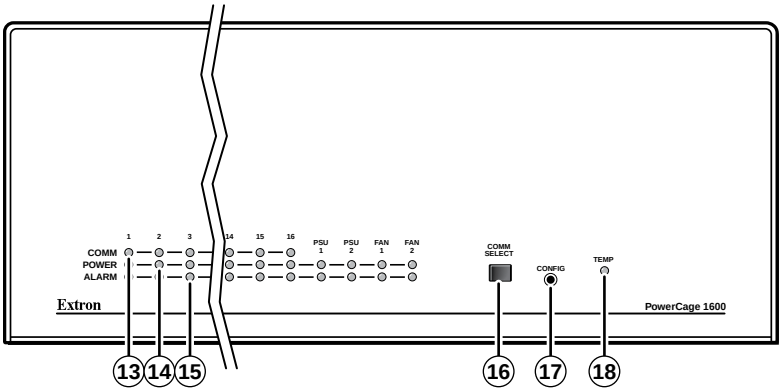


Figure 11. PowerCage Front Panel

⑬ **Comm LED (16 board locations) —** This LED lights to indicate that the board at this location is selected for connection to the Configuration port (item ⑰). Repeatedly press the Comm Select button (item ⑯) as necessary to select the desired board.

⑭ **Power LED (all locations) —** This LED lights to indicate that power is applied to the device at this location.

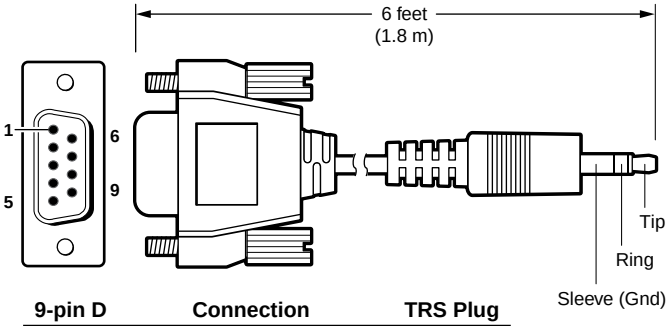
⑮ **Alarm LED (16 board locations) —** This LED lights to indicate that light is not received on the Rx connector of the board at this location.

Alarm LED (2 PS locations) — This LED lights to indicate that the power supply has failed or is out of tolerance.

Alarm LED (2 Fan locations) — This LED lights to indicate that the fan has failed.

⑯ **Comm Select button —** Repeatedly press this button as necessary to select the desired board for connection to the Configuration port (item ⑰). The Comm LED (item ⑬) for the selected board lights.

⑰ **Configuration port —** This 2.5 mm mini stereo jack serves the same serial communications function as the Remote RS-232 port on the transmitter or receiver board, but is easier to access than the ports on the boards after the units have been installed and cabled. The 9-pin D to 2.5 mm mini jack TRS RS-232 cable, included with the PowerCage enclosure, but also available separately, part number **70-335-01** (see figure 12), can be used for this connection.



9-pin D	Connection	TRS Plug
Pin 2	Computer Rx line	Tip
Pin 3	Computer Tx line	Ring
Pin 5	Computer signal ground	Sleeve

Figure 12. 9-pin TRS RS-232 Cable

NOTES:
- This port is for remote control of the transmitter or receiver, not for the over fiber RS-232 link.
- This port parallels the Remote RS-232 ports on the boards. If an active front panel configuration connection is made, the board Remote RS-232 port becomes inactive.
- The maximum distances from the transmitter or receiver to the controlling device can vary up to 200 feet (61 m). Factors such as cable gauge, baud rates, environment, and output levels (from the unit and the controlling device) all affect transmission distance. Distances of about 50 feet (15 m) are typically not a problem. In some cases, the unit may be capable of serial communications via RS-232 up to 250 feet (76 m) away.

This port is RS-232 only, with the following protocols:

- 9600 baud
- 1 stop bit
- no parity
- no flow control
- 8 data bits

⑱ **Temp LED —** This LED lights to indicate that the temperature within the PowerCage enclosure is at a dangerously high temperature (approximately 167 °F [75 °C]) and that equipment damage is imminent.

Operation

After the transmitter, all receivers, and their connected devices are powered up, the system is fully operational. If any problems are encountered, verify that the cables are routed and connected properly, and that all display devices have identical resolutions and refresh rates. If your problems persist, call the Extron S3 Sales & Technical Support Hotline (see the **contact numbers** on the rear of this manual for the Extron office nearest you.)

To take advantage of the various adjustments and test patterns available in the PowerCage FOX, you need to connect a computer or other RS-232 capable device to the Remote/RS-232 port on either unit or to the front panel Configuration port and operate using either **SIS commands** or the FOX Extender **control program** on a computer running Windows.

Remote Control

This section describes the remote control operation of the PowerCage FOX DVI and PowerCage FOX VGA, including:

- **Serial Ports**
- **Simple Instruction Set Control**
- **FOX Extender Program Control**

Serial Ports

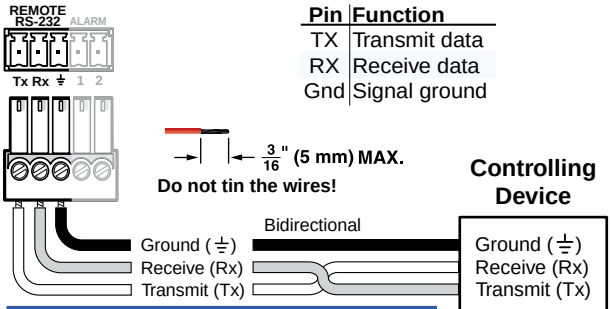
The transmitter and receiver boards each have an RS-232 serial port on a 3-pin captive screw connector that can be connected to a host device such as a computer running the HyperTerminal utility, an RS-232 capable PDA, or a control system. The PowerCage enclosure has a Configuration port, a 2.5 mm mini stereo jack, that parallels the board ports. These ports make serial control of the transmitter and receiver possible.

The protocol for all ports is as follows:

- 9600 baud
- 1 stop bit
- no parity
- no flow control
- 8 data bits

NOTES:
- For each unit, the Remote RS-232 port is active only if the PowerCage Configuration port is not active. If an active Configuration port connection is made, the Remote RS-232 port for that board becomes inactive.
- Only one fiber optic cable, transmitter-Tx-to-receiver-Rx, is required for video, audio, and serial command transmission. However, if you connect only one fiber optic cable, you will ***not*** receive RS-232 reports from the controlled device, and there will be ***reduced*** RS-232 command and control program functionality on the Rx unit. To receive responses from the controlled device and for full functionality, install both fiber optic cables and leave the PowerCage FOX receiver in normal configuration (via an **SIS command** for the PowerCage FOX Rx receiver).

Board Remote RS-232 Ports

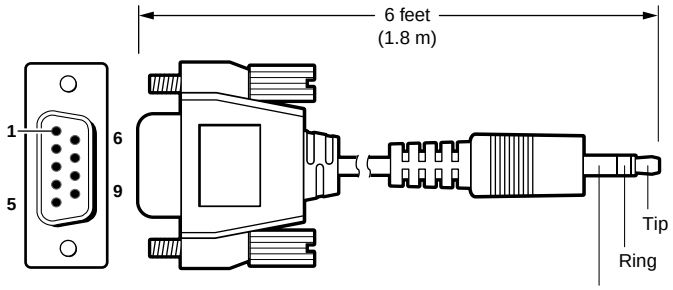


NOTE: Cross the Tx and Rx lines once between the source and the target.

Figure 13. Remote Connector Pin Assignments

PowerCage Configuration Port

The Extron 9-pin D to 2.5 mm mini jack TRS RS-232 cable, included with the PowerCage enclosure, but available separately, part #**70-335-01** (see figure 14) can be used for connection to the Configuration port.



9-pin D	Connection	TRS Plug
Pin 2	Computer Rx line	Tip
Pin 3	Computer Tx line	Ring
Pin 5	Computer signal ground	Sleeve

Figure 14. 9-pin TRS RS-232 Cable

Simple Instruction Set Control

Host-to-Unit Instructions

SIS commands consist of one or more characters per field. No special characters are required to begin or end a command character sequence. When a command is valid, the unit executes the command and sends a response to the host device. All responses from the unit to the host end with a carriage return and a line feed (CR/LF = ↵), which signals the end of the response character string. A string is one or more characters.

Symbol Definitions

↵ = CR/LF (carriage return/line feed)

← = Carriage return (no line feed)

• = Space (hard) character

Esc = Escape key (hex 1B)

X1	= Mute/auto memory status	0 = off	1 = on
X2	= Resolution	01 = 1920 x 1200 02 = 800 x 600 03 = 1024 x 768 04 = 1280 x 768 05 = 1280 x 1024 06 = 1365 x 768 07 = 1366 x 768 08 = 1400 x 1050 09 = 1600 x 1200 10 = 480p	11 = 576p 12 = 720p 13 = 1080i 14 = 1080p 15 = 640 x 480 16 = 1440 x 900 17 = 1280 x 800 18 = 1680 x 1050 19 = 1360 x 768
X3	= Refresh rate	1 = 50 Hz	2 = 60 Hz
X4	= Mode switch position	0 = off (down)	1 = on (up)
X5	= Output sync format	0 = RGBHV	1 = RGsB
X6	= Output sync polarity	0 = follows input	1 = force sync negative
X7	= Horizontal and vertical position	000 through 255	
X8	= Horizontal start	000 through 255	
X9	= Pixel phase	00 through 31	
X10	= Total pixels	± 255 of default value for selected resolution	
X11	= Sync frequency	*xxx.xx* (frequency in kHz [H] or Hz [V])	
X12	= Memory preset number	01 to 30	
X13	= Audio gain adjustment range	00 to 10	
X14	= Audio level adjustment range	–18 to +10 (in 1.0 dB steps)	
X15	= Audio attenuation adjustment range	00 to 18	
X16	= Audio output level	0 = consumer (–10 dBV)	1 = professional (+4 dBu)
X17	= Test pattern	0 = none 1 = Color Bars	2 = grayscale 3 = alternating pixels
X18	= Rx link and daisy chain enable	0 = disable 1 = return link enable	2 = daisy chain enable
X19	= Link and input status	0 = link or input not detected	1 = link or input detected
X20	= Video delay (0 plus six steps at 0.25 seconds per step)	0 = 0 second 1 = 0.25 second 2 = 0.5 second 3 = 0.75 second	4 = 1.0 second 5 = 1.25 second 6 = 1.5 second (default)
X21	= Transmission mode	SM = singlemode	MM = multimode
X22	= Transmitter or receiver	Tx = transmitter	Rx = receiver
X23	= Firmware version	*v.vv*	
X24	= Internal temperature	*nnn*F•*nn*C	

Unit-initiated Messages

When a local event, such as an equipment power-up, occurs, the unit responds by sending a message to the host. The unit-initiated messages are listed below:

`(c) Copyright 2010, Extron Electronics PowerCage FOX Tx VGA, V`*`x.xx`*`, 70-699-`*`xx`*`↵↵`

- or -

`(c) Copyright 2010, Extron Electronics PowerCage FOX Rx VGA, V`*`x.xx`*`, 70-699-`*`xx`*`↵↵`

- or -

`(c) Copyright 2010, Extron Electronics PowerCage FOX Tx DVI, V`*`x.xx`*`, 70-700-`*`xx`*`↵↵`

- or -

`(c) Copyright 2010, Extron Electronics PowerCage FOX Rx DVI, V`*`x.xx`*`, 70-700-`*`xx`*`↵↵`

- or -

`(c) Copyright 2010, Extron Electronics PowerCage FOX Tx DVI Plus, V`*`x.xx`*`, 70-873-`*`xx`*`↵↵`

- or -

`(c) Copyright 2010, Extron Electronics PowerCage FOX Rx DVI Plus, V`*`x.xx`*`, 70-873-`*`xx`*`↵↵`

The connected unit issues the appropriate copyright message (above) when it first powers on. V*x.xx* is the firmware version number; 70-*xxx-xx* is the part number of the connected unit.

`Reconfig↵`

The unit sends the Reconfig message whenever the video input signal to the transmitter is changed.

`1Lnk`[X19]`•2Lnk`[X19]`•RGB`[X19]`•Aud`[X19]`↵`

The unit sends the status message whenever a change in the fiber link and video and audio connection occurs.

`Dip`[X4][X4]`↵`

The unit sends the DIP switch position message whenever a change in the DIP switch settings on the receiver occurs.

NOTES:
- The Dip[X4][X4]↵ message occurs only when the connected receiver is a FOXBOX unit.
- Only DIP switch 1 (the first [X4]) has any effect on the system operation. When the switch is on (up), the receiver is in daisy chain mode.

Error Responses

When the unit receives a valid SIS command, it executes the command and sends a response to the host device. If the unit is unable to execute the command because the command is invalid or it contains invalid parameters, the unit returns an error response to the host. The error response codes are:

E10 - Invalid command
E11 - Invalid preset number
E13 - Invalid parameter
E14 - Invalid command for this configuration

Using the Command/Response Tables

The command/response table begins on the next page. Either uppercase or lower case letters are acceptable in the command field except where indicated for the audio level (gain and attenuation) commands. Symbols are used throughout the table to represent variables in the command/response fields. Command and response examples are shown throughout the table. The ASCII to HEX conversion table below is for use with the command/response table.

ASCII to Hex Conversion Table

Space →	20	!	21	"	22	#	23	$	24	%	25	&	26	'	27
(	28	)	29	*	2A	+	2B	,	2C	-	2D	.	2E	/	2F
Ø	30	1	31	2	32	3	33	4	34	5	35	6	36	7	37
8	38	9	39	:	3A	;	3B	<	3C	=	3D	>	3E	?	3F
@	40	A	41	B	42	C	43	D	44	E	45	F	46	G	47
H	48	I	49	J	4A	K	4B	L	4C	M	4D	N	4E	O	4F
P	50	Q	51	R	52	S	53	T	54	U	55	V	56	W	57
X	58	Y	59	Z	5A	[	5B	\	5C	]	5D	^	5E	_	5F
`	60	a	61	b	62	c	63	d	64	e	65	f	66	g	67
h	68	i	69	j	6A	k	6B	l	6C	m	6D	n	6E	o	6F
p	70	q	71	r	72	s	73	t	74	u	75	v	76	w	77
x	78	y	79	z	7A	{	7B	|	7C	}	7D	~	7E	DEL	7F

Esc 1B CR ØD LF ØA

Command/Response Table for SIS Commands

Command	ASCII Command (host to unit)	Response (unit to host)	Additional description
Video mute			
Mute output	1B	Blk1↵	Blank the video output.
Unmute output	0B	Blk0↵	Output video.
Show video mute status	B	X1↵	Video mute status is X1.
Display Data Channel (DDC) resolution and rate (systems with DVI receivers only)			
NOTE: If the receiver is a FOX 500, the rear panel DDC Resol(ution) rotary switch on the transmitter must be in position 1 for the variables to be changeable via an SIS command. The unit returns the E14 error if the switch is in other than position 1.			
Set DDC resolution and rate	41*X2*X3#	DDCX2*X3↵	Select a DDC resolution and refresh rate.
Show DDC resolution and rate	41#	X2*X3↵	Show the DDC resolution and refresh rate.
Mode switch position (systems with FOXBOX receivers only)			
NOTE: Only DIP switch 1 (the first X4) has any effect on the system operation. When the switch is on (up), the receiver is in daisy chain mode.			
Show DIP switch position	8#	X4X4↵	Show the FOXBOX receiver DIP switch position.
Output sync format			
Set output sync format	6*X5#	SynX5↵	Set the sync format.
Show output sync format	6#	X5↵	
Output sync polarity			
Set output polarity negative	7*1#	Pol1↵	Force the receiver output to always be negative.
Set polarity to the input	7*0#	Pol0↵	Polarity follows the video sync input to the transmitter.
Show output sync polarity	7#	X6↵	
Horizontal shift			
Set a horizontal position	X7H	HphX7↵	Set horizontal centering to X7.
Increment position	+H	HphX7↵	Shift the image one pixel to the right.
Decrement position	–H	HphX7↵	Shift the image one pixel to the left.
Show position	H	X7↵	
Vertical shift			
Set a vertical position	X7/	VphX7↵	Set vertical centering to X7.
Increment position	+/	VphX7↵	Shift the image down one line.
Decrement position	–/	VphX7↵	Shift the image up line.
Show position	/	X7↵	
Horizontal start			
NOTE: When the controlling PC is connected to the receiver, the PowerCage FOX can perform this command only if the receiver-Tx-to-transmitter-Rx fiber cable is connected. The unit returns the E14 error if the Rx fiber is not connected.			
Set a start position	X8)	HstX8↵	Set the horizontal location of the first active pixel.
Example:	128)	Hst128↵	Set pixel 128 as the first active pixel.
Increment start position	+)	HstX8↵	Increase the horizontal start location value.
Decrement start position	–)	HstX8↵	Decrease the horizontal start location value.
Show start position	)	X8↵	

NOTE:

X1 = Mute status	0 = off	1 = on
X2 = Resolution	01 through 19. See page 18.	
X3 = Refresh rate	1 = 50 Hz	2 = 60 Hz
X4 = Mode switch position	0 = off (down)	1 = on (up)
X5 = Output sync format	0 = RGBHV	1 = RGsB
X6 = Output sync polarity	0 = follows input	1 = force sync negative
X7 = Horizontal and vertical position	000 through 255	
X8 = Horizontal start	000 through 255	

Command/response table for SIS commands (continued)

Command	ASCII Command (host to unit)	Response (unit to host)	Additional description
Pixel phase			
NOTE: When the controlling PC is connected to the receiver, the PowerCage FOX can perform this command only if the receiver-Tx-to-transmitter-Rx fiber cable is connected. The unit returns the E14 error if the Rx fiber is not connected.			
Set a pixel phase value	X9U	PhsX9↵	Set the pixel phase value to X9.
Example:	10U	Phs10↵	Set the pixel phase value to 10.
Increment pixel phase	+U	PhsX9↵	Increase pixel phase value by 1.
Decrement pixel phase	–U	PhsX9↵	Decrease pixel phase value by 0.
Show pixel phase	U	X9↵	
Total pixels			
NOTE: When the controlling PC is connected to the receiver, the PowerCage FOX can perform this command only if the receiver-Tx-to-transmitter-Rx fiber cable is connected. The unit returns the E14 error if the Rx fiber is not connected.			
Set a total pixel value	11*X10#	TpxX10↵	Set the total pixels to a specific value.
Example:	11*1555#	Tpx1555↵	Set the total pixel value to 1555.
Increment total pixel value	+11#	TpxX10↵	Increase total pixels by 1 pixel.
Decrement total pixel value	–11#	TpxX10↵	Decrease total pixels by 1 pixel.
Show total pixel value	11#	TpxX10↵	
List sync frequency			
View input frequency	1LS	X11,X11↵	List the input sync frequency as X11 kHz (horizontal) and X11 Hz (vertical).
Memory presets			
Save preset	X12,	SprX12↵	Command code is a comma.
Recall preset	X12.	RprX12↵	Command code is a period.
Audio input gain and attenuation			
NOTES: • The set gain (**G**) and set attenuation (**g**) commands **are** case sensitive. The increment level, decrement level, and show level **are not** case sensitive. • When the controlling PC is connected to the receiver, the PowerCage FOX can perform this command only if the receiver-Tx-to-transmitter-Rx fiber cable is connected. The unit returns the E14 error if the Rx fiber is not connected.			
Set input audio gain to a +dB value	X13G	AudX14↵	Set the input level (gain) to +X13 dB.
Example:	2G	Aud+02↵	Set the input level (gain) to +2 dB.
Set input audio attenuation to a -dB value	X15g	AudX14↵	Set the input level (attenuation) to –X13 dB.
Increment input level	+G	AudX14↵	Increase the audio level by 1 dB.
Example:	+G	Aud+03↵	Increment the input level from +2 dB to +3 dB.
Decrement input level	–G	Aud–01↵	Decrease the audio level from 0 dB to –1 dB.
Show input level	G	X14↵	
Audio output level			
Set the output to the consumer level	40*0#	Lvl0↵	Set the audio output to the consumer level (–10 dBV).
Set the output to the professional level	40*1#	Lvl1↵	Set the audio output to the professional level (+4 dBu).
Show output level	40#	X16↵	

NOTE:	X9 = Pixel phase	00 to 31
	X10 = Total pixels	± 255 of default value for selected resolution
	X11 = Sync frequency	*xxx.xx* (frequency in kHz [H] or Hz [V]
	X12 = Memory preset number	01 to 30
	X13 = Audio gain adjustment range	00 to 10
	X14 = Audio level adjustment range	-18 to +10 (in 1.0 dB steps)
	X15 = Audio attenuation adjustment range	00 to 18
	X16 = Audio output level	0 = consumer (–10 dBV) 1 = professional (+4 dBu)

Command/response table for SIS commands (continued)

Command	ASCII Command (host to unit)	Response (unit to host)	Additional description
Audio mute			
Mute the audio	1Z	Amt1↵	Silence the audio output of the receiver.
Unmute the audio	0Z	Amt0↵	The receiver outputs audio.
Show audio mute statue	Z	X1↵	Audio mute status is X1.
Auto memory			
Disable auto memory	55*0#	Img0↵	
Enable auto memory	55*1#	Img1↵	
Show auto memory status	55#	X1↵	
Auto Image™			
Trigger Auto Image	55*2#	Img↵	
Test pattern			
NOTE: You must have a video input connected and the transmitter-Tx-to-receiver-Rx fiber cable connected for the receiver to output a selected test pattern. The test pattern turns off if the input signal rate changes or is disconnected or if power is removed.			
Output Color Bars	1J	Tst1↵	Set the receiver to output the Color Bars test pattern.
Output grayscale	2J	Tst2↵	Set the receiver to output the grayscale test pattern.
Output alternating pixels	3J	Tst3↵	Set the receiver to output the alternating pixels test pattern.
Turn test pattern off	0J	Tst4↵	Set the receiver to output the input video (no test pattern is selected).
Show test pattern status	J	X17↵	
Disable and enable return link and daisy chain			
NOTE: The disable return link function is primarily used and recommended when the transmitting device is a FOX 500 DA6 and the receiver is connect to any of outputs 2 through 6 on the DA.			
Disable return link	66*0*0#	Rle*0*0↵	Disable link 2.
Enable return link to transmitter	66*0*1#	Rle*0*1↵	Enable link 2 (default setting).
Enable daisy chain	66*0*2#	Rle*0*2↵	Enable receiver daisy chain mode.
Show return link and daisy chain status	66*0#	0*X18↵	
Video delay			
NOTES: • The Set Video Delay command delays all analog, video, and sync video planes. This can help monitors sync correctly during an input rate change. • **Only** video is delayed. Audio is **not** delayed.			
Set video delay	3*Y11#	Dly X20↵	Delay video by an interval of Y11.
Example:	3*3#	Dly3↵	Delay video by an interval of 0.75 seconds (3 x 0.25 seconds).
Show video delay	3#	X20↵	

NOTE:
X1 = Mute and auto memory status — 0 = off; 1 = on
X17 = Test pattern — 0 = none; 1 = Color Bars; 2 = grayscale; 3 = alternating pixels
X18 = Rx link and daisy chain enable — 0 = disable; 1 = return link enable; 2 = daisy chain enable
X20 = Video delay (0 plus six steps at 0.25 seconds per step) — 0 = 0 second; 1 = 0.25 second; 2 = 0.5 second; 3 = 0.75 second; 4 = 1.0 second; 5 = 1.25 second; 6 = 1.5 second (default)

Command/response table for SIS commands (continued)

Command	ASCII Command (host to unit)	Response (unit to host)	Additional description
Information requests			
Information request	I	1Lnk[X19]•2Lnk[X19]•RGB[X19]•Aud[X19]•[X21]•[X22]↵	The unit responds with the current status (signal detected) of optical link 1, optical link 2, the video input, and the audio link; the fiber optic transmission mode (singlemode or multimode); and the device type (Tx or Rx).
NOTE: The receiver monitors the primary (transmitter-TX to receiver-Rx) fiber cable. If the PC is connected to the transmitter and the receiver-Tx-to-transmitter-Rx fiber cable is not connected, for the **I** and **1S** commands, the transmitter reports `1link0` regardless of the status of the primary cable.			
Show firmware version	Q	[X23]↵	
Example:	Q	1.23↵	The factory-installed firmware version is 1.23 (sample value only).
Request part number	N	70-*nnn*-*nn*↵	See "**Part Numbers**."
Request part number of other unit	1N	70-*nnn*-*nn*↵ or 60-*nnn*-*nn*↵	See "**Part Numbers**."
Show link 1 status	1S	[X19]↵	Light status on transmitter-Tx-to-receiver-Rx cable.
Show link 2 status	2S	[X19]↵	Light status on receiver-Tx-to-transmitter-Rx cable.
Show input video status	3S	[X19]↵	Show transmitter video input status.
Show input audio status	4S	[X19]↵	Show transmitter audio input status.
Show temperature	20S	[X24]↵	Show temperature in degrees Fahrenheit and Celsius.
Resets			
Reset audio	[Esc]ZA←	Zpa↵	Reset audio setting to default levels (0 dB gain).
Reset memory presets	[Esc]ZG←	Zpg↵	Reset (erase) all memory presets.
System reset	[Esc]ZXXX←	Zpx↵	Reset all settings to factory defaults.

NOTE:
[X19] = Link status — 0 = light or signal input not detected; 1 = light or signal detected
[X21] = Transmission mode — SM = singlemode; MM = multimode
[X22] = Transmitter or receiver — Tx = transmitter; Rx = receiver
[X23] = Firmware version — *v.vv*
[X24] = Internal temperature — *nnn*F•*nn*C

FOX Extender Program Control

The Extron FOX Extender program, which communicates with the transmitter and receiver pair via the Remote RS-232 port of either unit or the PowerCage Configuration port, provides an easy way to operate the pair.

The program is compatible with Windows 2000, Windows XP, or later. Updates to this program can be downloaded from the Extron website (**www.extron.com**).

Installing the Software

The program is contained on a DVD. To install the software, insert the DVD into the drive. The Extron software DVD window should appear automatically. If it does not self-start, run Launch.exe from the DVD. Click the **Software** tab, scroll to the desired program, and click **Install**. Follow the instructions that appear on the screen. By default, the installation creates a `C:\Program Files\Extron\FOX_Extenders` directory, and it places four icons into a group folder named "Extron Electronics\FOX Extender." The four installed icons are:

- `Uninstall FOX Extender WCP`
- `Check for FOX Extender updates`
- `FOX Extender`
- `FOX Extender Help`

Starting the Program

Start the Extron FOX Extender program as follows:

1. Click **Start** > **Programs** > **Extron Electronics** > **FOX Extender** > **FOX Extender**.

   The `Communication Setup` window appears (see figure 15).

Figure 15. Communication Setup Window

2. Select the Com port to which your transmitter or receiver is connected. Click **OK**. The `FOX Extender` program window appears (see figure 16).

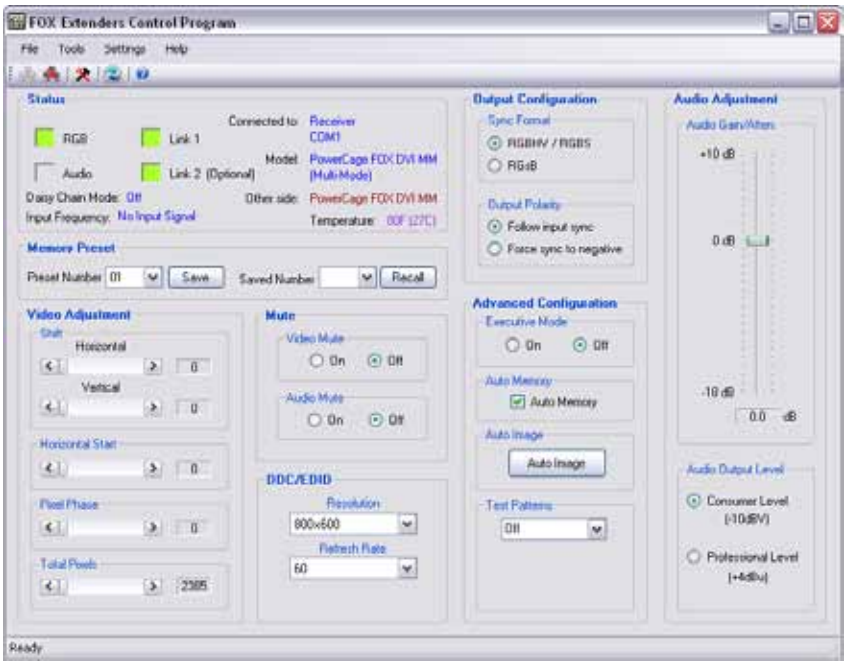


Figure 16. FOX Extender Program Window

NOTE: Only one fiber optic cable, transmitter-Tx-to-receiver-Rx, is required for serial command transmission. However, if you connect only one fiber optic cable, there will be ***reduced*** control program functionality on the Rx unit. For full functionality, install both fiber optic cables and leave the PowerCage FOX receiver in normal mode (via an **SIS command** for the PowerCage FOX Rx receiver).

Status area

The **Status** area provides visual indications of the connection status.

- **RGB indicator —** This indicator is green when the transmitter detects a sync signal on its video input:
  - Horizontal sync (H) (for RGBHV video)
  - Composite sync (S) (for RGBS video)
  - Green (Sync on green) (G) (for RGsB or RsGsBs video)
  - DVI video
- **Audio indicator —** This indicator is green when the transmitter detects a low level audio signal for a short period. This indicator goes dark if the audio signal drops below the minimum threshold for a short period.
- **Link 1 indicator —** This indicator is green when the receiver detects light on the fiber optic cable connected to the Tx port.

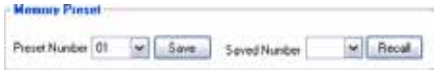
> **NOTE:** The receiver detects the transmitter-Tx-to-receiver-Rx light. It reports the status to the transmitter via the optional Rx cable.
>
> If the PC is connected to the transmitter **and** *either* the secondary (receiver-Tx-to-transmitter-Rx) cable is not connected in your system *or* the receiver is in the daisy chain mode, the Link 1 indicator in the control program does not show green (detected), whether the receiver detects the link or not.

- **Link 2 (Optional) indicator —** This indicator is green when the transmitter detects light on the fiber optic cable connected to the Rx port.

> **NOTE:** The transmitter detects the receiver-Tx-to-transmitter-Rx light. It reports the status to the receiver via the Tx cable.
>
> If the PC is connected to the receiver **and** *either* the primary (transmitter-Tx-to-receiver-Rx) cable is disconnected *or* the receiver is in the daisy chain mode, the Link 2 indicator in the control program will not show green (detected), whether the transmitter detects the link or not.

The **Status** area also shows which unit the controlling PC is connected to, the PowerCage FOX model (multimode or singlemode), the internal temperature, the daisy chain mode, and the video input frequency. The "Other Side" entry is the device connected to the far end of the fiber optic cable.

Memory Preset area



The **Memory Preset** area provides a means to save and recall memory presets. Memory presets are stored values of the horizontal and vertical position and sizing information saved in nonvolatile memory. When the PowerCage FOX is powered down and later powered back up, the settings are available for selection using the **Recall** button. Saving the settings to a preset using the **Save** button overwrites the settings previously written to that preset.

Mute area

Click the **Video Mute** radio button, the **Audio Mute** radio button, or both in the **Mute** area to turn the video and audio mutes on and off.

NOTES:

- When the video output is RGB and the output is muted, the receiver mutes the red, green, and blue planes, but leaves the sync planes (horizontal and vertical or composite sync) live so that there is no loss of sync in the display device.
- When you mute or unmute the output, the setting is changed in the receiver. It reports the changes to the transmitter via the optional receiver-Tx-to-transmitter-Rx cable.

  If you are connected to the transmitter **and** *either* the receiver-Tx-to-transmitter-Rx cable is not connected in your system *or* the receiver is in the daisy chain mode, you can still mute the output in the Mute area, but the program cannot report the position values. The **Set video** (or **audio**) **mute On** or **Off** message is displayed for approximately 1 second (see figure 17).

Figure 17. Alternate Mute Area Indication

DDC/EDID Resolution area

The **DDC/EDID Resolution** area provides drop-down boxes that let you manually set the DDC/EDID resolution and refresh rate.

Video Adjustment area

The **Video Adjustment** area provides slider controls that let you change the following video parameters:

- Shift Horizontal (position)
- Shift Vertical (position)
- Horizontal Start
- Pixel Phase
- Total Pixels

NOTES:

- When you make changes to the horizontal start, pixel phase, or total pixels settings, the value is changed in the transmitter.
- If the PC is connected to the receiver **and** *either* the receiver-Tx-to-transmitter-Rx cable is not connected in your system *or* the receiver is in the daisy chain mode, you cannot change these values using the control program. These slider controls are unavailable.
- When you make horizontal or vertical position changes (shift the image), the setting is changed in the receiver. It reports the shift values to the transmitter via the optional receiver-Tx-to-transmitter-Rx cable.

  If the PC is connected to the transmitter **and** *either* the receiver-Tx-to-transmitter-Rx cable is not connected in your system *or* the receiver is in the daisy chain mode, you can still shift the image in the Video Adjustment area, but the program cannot report the position values.

Output Configuration area

Sync Format radio buttons — The PowerCage FOX receiver outputs RGBHV or RGsB video depending on the input to the transmitter only. The radio buttons in this area have no effect on the PowerCage FOX receiver. Refer to the *FOX 500 User Guide* if you are using one of those products to receive the fiber optic signal, as the video output of those products can be configured.

Output Polarity radio buttons — Click either the **`Follow input sync`** or **`Force sync to negative`** radio button to select the desired video output sync polarity.

NOTE: When you make output configuration changes, the setting is changed in the receiver. It reports the changes to the transmitter via the optional receiver-Tx-to-transmitter-Rx cable.

If the PC is connected to the transmitter **and** *either* the receiver-Tx-to-transmitter-Rx cable is not connected in your system *or* the receiver is in the daisy chain mode, the program cannot report the output sync format and polarity position settings in the `Video Adjustment` area. You can change the output sync format and polarity, but the program cannot report the changes.

Advanced Configuration area

Executive Mode buttons — The `Executive Mode` radio buttons have no effect on the operation of the PowerCage FOX units.

Auto Memory checkbox — Click the **`Auto Memory`** checkbox to automatically apply saved position, horizontal start, total pixels, and pixel phase settings when the sensed input resolution changes.

Auto Image button — Click the **`Auto Image`** button to adjust the output settings for the best image, based on the sensed input resolution.

Test Patterns drop box — Select one of three built-in test patterns; **`Color Bars`**, **`grayscale`**, and **`alternating pixels`**; as necessary to help adjust the color, brightness/contrast, and focus of the display. Select **`Off`** to output the video input to the transmitter.

NOTE: You must have a video input connected and the transmitter-Tx-to-receiver-Rx fiber cable connected and the receiver must be in the normal mode for the receiver to output a selected test pattern.

The test pattern turns off if the input signal rate is changed or disconnected or if power is removed.

Audio Adjustment area

Audio Gain/Attenuation slider — Click and drag the **Audio Gain/Attenuation** slider control to select the input audio gain or attenuation value, from -18 dB to +10 dB in 1.0 dB increments.

NOTE: When you make input gain or attenuation changes, the setting is changed in the transmitter.
If the PC is connected to the receiver **and** *either* the receiver-Tx-to-transmitter-Rx cable is not connected in your system *or* the receiver is in the daisy chain mode, you cannot change the input value from the Audio Adjustment area.

Audio Output Level radio buttons — Click either the **Consumer Level** (-10 dBV) or **Professional Level** (+4 dBu) radio button to select the output audio level.

NOTE: When you make an audio output level change, the setting is changed in the receiver. It reports the changes to the transmitter via the optional receiver-Tx-to-transmitter-Rx cable.
If the PC is connected to the transmitter **and** *either* the receiver-Tx-to-transmitter-Rx cable is not connected in your system *or* the receiver is in the daisy chain mode, the program cannot report the output audio level in the Audio Adjustment area. You can change the level, but the program cannot report the changes. The program shows the Set Consumer (or Set Professional) level message to indicate that the output level command is control only, not an indication (see figure 18). The message is displayed for approximately 1 second.

Figure 18. Alternate Audio Adjustment Area Indication

Firmware upgrade

Firmware can be upgraded for each unit via the PowerCage Configuration port using the Extron Firmware Loader utility from the Windows-based control program.

NOTES:
- Firmware can be upgraded through the PowerCage Configuration port **only**.
- When firmware upgrades are available, they are unique to the unit:
  - A unique transmitter firmware upgrade for the Tx unit
  - A unique receiver firmware upgrade for the Rx unit.
- Your PC must be connected directly to the unit for the firmware to be updated.

Downloading the firmware from the website

To obtain the latest version of firmware for your PowerCage FOX unit:

1. Visit the Extron website, www.extron.com, click the **Download** tab, and then click the **Firmware** link on the left sidebar menu (see figure 19).

Figure 19. Location of Firmware Upgrade Files

2. On the Download Center screen (see figure 20), click the links for the appropriate firmware file or files.

NOTE: There are different files for transmitters (Txs) and receivers (Rxs) and for VGA and DVI units.

Figure 20. PowerCage FOX Firmware

3. Complete the `Personal Information` form (see figure 21) and click the **`Download`** button.

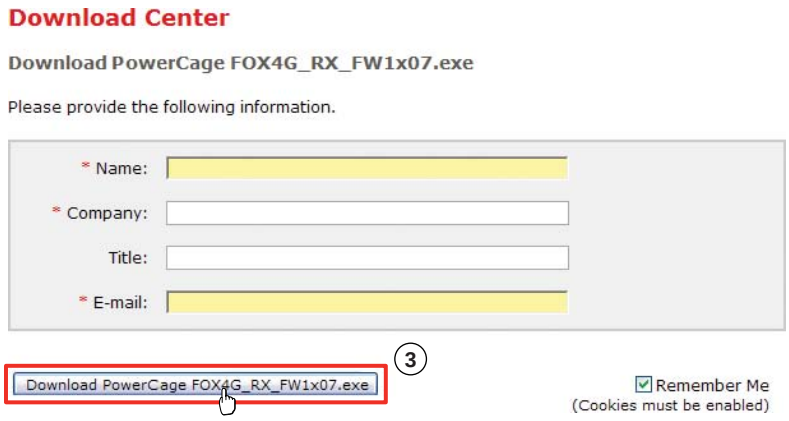


Figure 21. Personal Information Form

4. Follow the instructions on the rest of the download screens to download the firmware update from the Extron website, start the Extron Installation Program to extract the firmware file, and place it in a folder identified in the program window.

NOTE: Note the folder to which the firmware file is saved (see figure 22).

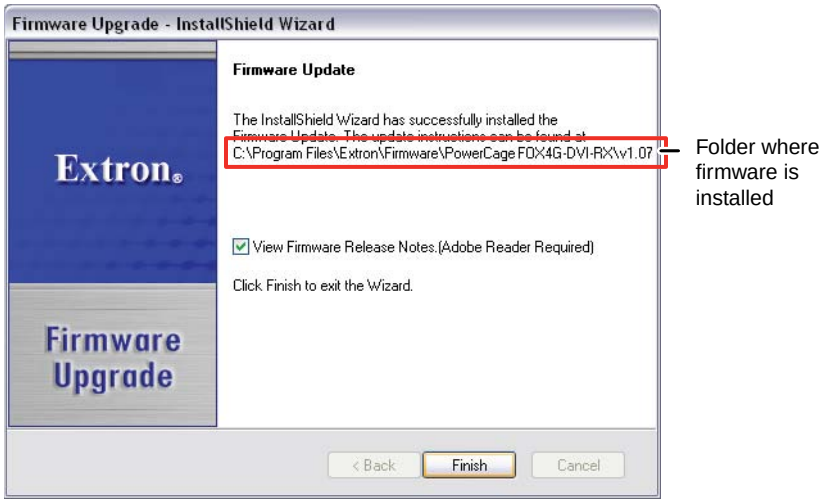


Figure 22. Location of the Firmware File

Loading the firmware to the unit

To load a new version of firmware to your transmitter and receiver, open the Firmware Loader software from within the FOX Extender program. Your serial port on your computer must be connected to the PowerCage Configuration port **only** (see item ⑰ in the PowerCage Front Panel Port, Control, and Indicators section for more information.)

1. In the FOX Extender program, click the **Firmware Loader** button ( ) on the tool bar.

   NOTE: If the Firmware Loader button does not appear on the tool bar of the program, the Firmware Loader software is not installed. Install it as follows:

   a. On the Extron website, click the **Download** tab.

   b. On the Download Center page, click **Software** on the left sidebar menu.

   c. Locate the "Firmware Loader" line and click the Download link at the far right.

   d. Follow the instructions on the download screens to save the installer file to your computer.

   e. In Windows Explorer or another file browser, locate the Firmware Loader executable file in the file system of your computer and double-click on it to open it.

   f. Follow the instructions on the Installation Wizard screens to install the Firmware Loader on your computer. Unless you specify otherwise, the installer program places the Firmware Loader file, "FWLoader.exe" in C:\Program Files\Extron\FWLoader.

   If the Extron and FWLoader folders do not yet exist in your Program Files folder, the installer creates them.

2. If you have not previously updated firmware for the PowerCage FOX unit before, on the Add Device screen (see figure 23), select the **RS-232** tab.

   If you have previously updated firmware for this model, click **Cancel**. The Firmware Loader window appears. Proceed to step **5**.

   NOTE: Although the screen also has a TCP/IP tab, the PowerCage FOX unit does not have a LAN port. Do not select the TCP/IP tab.

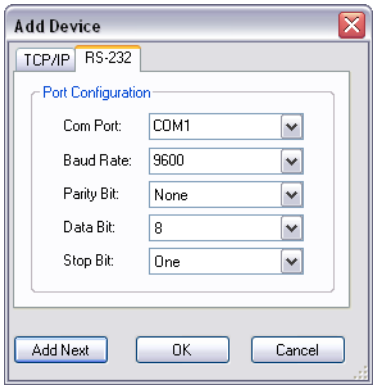


Figure 23. Add Device Screen

3. From the drop-down menus on the **RS-232** screen, select the appropriate Com port number and baud rate (the default is 9600).
4. Click **OK**. The **Firmware Loader** window appears (see figure 24).

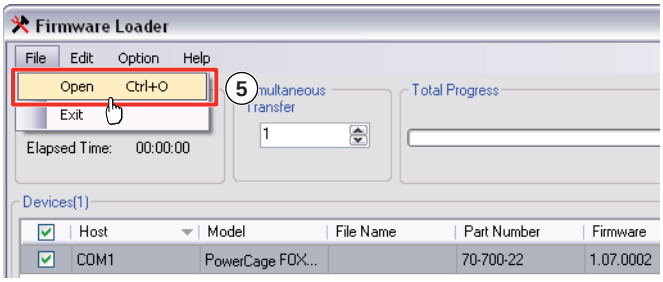


Figure 24. Extron Firmware Loader Window

5. Select the PowerCage FOX unit and click **File** > **Open**. The **Choose Firmware File** screen appears (see figure 25).

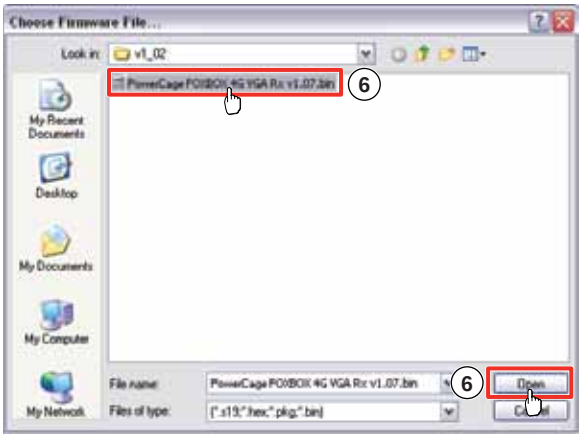


Figure 25. Choose Firmware File Window

6. Navigate to and select the new firmware file. Click **Open**. The **Choose Firmware File** window closes.

NOTE: When downloaded from the Extron website, the firmware is placed in a subfolder of **C:\Program Files\Extron\Firmware**.

CAUTION: The firmware file must have a **.bin** extension. Other file types can cause the switcher to stop functioning.

7. In the Firmware Loader window, click **Begin** (see figure 26).

   The **Total Progress** and **Progress Status** bars show the progress of the upload. The firmware upload to the switcher may take several minutes. Once the status bars have progressed from 0% to 100%, and Status is listed as Completed, the firmware loader utility resets the unit.

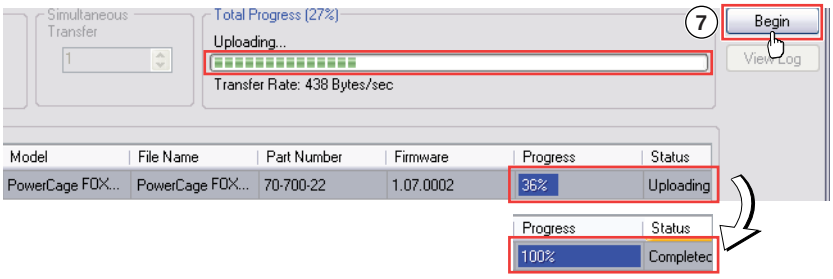


Figure 26. Firmware Loader Screen

8. Click **Exit** to close the Firmware Loader.

Reference Information

This section provides the specifications, part numbers, and installation instructions for the PowerCage FOX DVI and PowerCage FOX VGA.

- Specifications
- Part Numbers
- Installing a Board in the Enclosure

Specifications

NOTE: The PowerCage FOX boards are available in singlemode or multimode versions.

NOTE: The optional PowerCage FOX boards are class 1 laser products. They meet the safety regulations of IEC-60825, FDA 21 CFR 1040.10, and FDA 21 CFR 1040.11.

Optical specifications — PowerCage FOX boards, interconnection between transmitter and receiver

Number/type ..... 1 singlemode or 1 multimode fiber optic input and output per FOX board, up to 8 double space boards per PowerCage enclosure

NOTE: Only one fiber is required to transmit video, audio, and unidirectional data. A second fiber is required to transmit return data for bidirectional control/communication.

Connectors ..... 2 bidirectional LC connectors per FOX board

Operating distance

- Singlemode ..... 30 km (18.75 miles) with singlemode (SM) cables with a SM board
- Multimode..... 300 m (985') with 62.5 µm multimode (MM) cable and a MM board
  1 km (3280') with 50 µm multimode (MM) cable and a MM board
  2 km (6561') with 50 µm 2000 MHz bandwidth laser optimized MM cable and a MM board

NOTE: Operating distance is approximate. These are typical distances. The maximum distance may be greater than these typical numbers depending on factors such as fiber type, fiber bandwidth, connector splicing, losses, modal or chromatic dispersion, environmental factors, and kinks.

Nominal peak wavelength..... 850 nm for multimode (MM), 1310 nm for singlemode (SM)

Transmission power, singlemode or multimode
-5 dBm, typical

Maximum receiver sensitivity

- Singlemode ..... -18 dBm, typical
- Multimode..... -12 dBm, typical

Optical loss budget
- Singlemode ..... 13 dB, maximum
- Multimode..... 7 dB, maximum

Maximum channel data rate..... 4.25 Gbps

Video — PowerCage FOX Tx/Rx VGA

NOTE: For PowerCage FOX VGA boards, the analog video input signal is digitized pixel for pixel in the transmitter, sent digitally through the fiber cable, and converted back to analog video in the receiver.

Signal type ..... VGA-UXGA RGBHV, RGBS, RGsB, RsGsBs
Gain..... Unity
Pixel data bit depth ..... 8 bits per channel, 3 channels (R, G, B)
Maximum resolution ..... 1600x1200 or 1080p @ 60 Hz, digitized pixel for pixel; higher resolutions up to 2048x1120, undersampled

Video input — PowerCage FOX Tx VGA

Number/signal type ..... 1 VGA-UXGA RGBHV, RGBS, RGsB, RsGsBs
Connector..... 1 female 15-pin HD
Nominal levels..... 0.7 Vp-p for RGB
Minimum/maximum levels..... Analog: 0.3 V to 0.75 Vp-p with no offset, terminated
Impedance ..... 75 ohms
Horizontal frequency ..... 24 kHz to 100 kHz
Vertical frequency..... 40 Hz to 120 Hz
Return loss ..... <-40 dB @ 5 MHz

Video output — PowerCage FOX Rx VGA

Number/signal type ..... With input from a FOXBOX Tx VGA or a FOX 500 Tx:
1 VGA-UXGA RGBHV, RGsB (follows input or can be set by user)
With input from a FOXBOX Tx VGA/YUV:
1 VGA-UXGA RGBHV, component video (bi- or tri-level YUV, 480p, 576p, 720p, 1080i, 1080p)
Connector..... 1 female 15-pin HD
Nominal levels..... 1 Vp-p for Y of component video
0.7 Vp-p for RGB and for R-Y and B-Y of component video
Minimum/maximum levels..... 0.3 V to 0.75 Vp-p, terminated
Impedance ..... 75 ohms
Return loss ..... -30 dB @ 5 MHz
DC offset ..... ±5 mV with input at 0 offset
Video delay ..... 1-2 frames

Sync — PowerCage FOX Tx/Rx VGA

Input type ..... RGBHV, RGBS, RGsB, RsGsBs
Output type ..... RGBHV, RGsB (follows input or can be set by user)
Input level ..... 2.5 V to 5.0 Vp-p
Output level ..... TTL: 5.0 Vp-p, unterminated, on HV, for RGBHV
0.3 Vp-p for component video (bi-level sync) or for Gs (SOG)
0.6 Vp-p for component video (tri-level sync)
Input impedance ..... 10k ohms
Output impedance ..... 75 ohms
Polarity..... Positive or negative (follows input or can be set by user)

Video — PowerCage FOX Tx DVI, PowerCage FOX Tx/Rx DVI Plus

Resolution range
- PowerCage FOX Tx DVI..... Up to 1600x1200 or 1080p @ 60 Hz pixel for pixel; higher resolutions up to 1920x1200 @ 60 Hz, undersampled
- PowerCage FOX Tx/Rx DVI Plus Up to 1920x1200 or 1080p @ 60 Hz pixel for pixel

Formats..... RGB and YCbCr digital video
Standards..... DVI 1.0, HDMI 1.2

Video input — PowerCage FOX Tx DVI, PowerCage FOX Tx DVI Plus

Number/signal type ..... 1 single link DVI-D (or HDMI*)
Connector ..... 1 female DVI-I

NOTE: *Appropriate DVI-D to HDMI cables or adapters are required for HDMI signal input/output. The PowerCage FOX DVI and DVI Plus boards can be used to distribute HDMI signals if you use a DVI-to-HDMI adapter. However, when using HDMI signals, these units do not transmit audio and CEC signals.
These boards do not support transmission of DVI signals with High-bandwidth Digital Content Protection (HDCP).

Video output — PowerCage FOX Rx DVI Plus

Number/signal type ..... 1 single link DVI-D (or HDMI*)
Connector ..... 1 female DVI-I
Nominal level ..... 0.8 Vp-p
Video delay ..... 1-2 frames

Audio

NOTE: In PowerCage FOX boards, the analog audio signal(s) is (are) digitized in the transmitter, sent through the fiber cable, and converted back to analog audio in the receiver.

Gain
  Range ..... Adjustable, -18 dB to +10 dB
  Default ..... Unbalanced output: -6 dB; balanced output: 0 dB
Frequency response ..... 20 Hz to 20 kHz, ±0.5 dB
THD + Noise
  VGA and DVI boards ..... 0.10% @ 1 kHz at nominal level
  AV boards ..... 0.15% @ 1 kHz at nominal level
S/N ..... >80 dB at maximum output (unweighted)
CMRR ..... 65 dB @ 20 Hz to 20 kHz
Audio bits per sample ..... 18 bits per channel, 2 channels (L, R)
Sampling rate ..... 48 kHz

Audio input

Number/signal type ..... 1 unbalanced stereo or 2 unbalanced mono
Connector ..... (1) 3.5 mm captive screw connector, 5 pole
Impedance ..... 10k ohms unbalanced, 20k ohms balanced, DC coupled
Nominal level ..... +4 dBu (1.23 Vrms), -10 dBV (316 mVrms)
Maximum level ..... +17 dBV, (unbalanced) at 1% THD+N

NOTE: 0 dBu = 0.775 Vrms, 0 dBV = 1 Vrms, 0 dBV ≈ 2 dBu

Audio output

Number/signal type ..... 1 unbalanced stereo or 2 unbalanced mono
Connector ..... (1) 3.5 mm captive screw connector, 5 pole
Impedance ..... 50 ohms unbalanced, 100 ohms balanced
Nominal level ..... +4 dBu (1.23 Vrms), -10 dBV (316 mVrms)
Maximum level (Hi-Z) ..... +19 dBu, unbalanced at 1% THD+N
Maximum level (600 ohms) ..... >+15 dBm, unbalanced at 1% THD+N
Audio delay ..... 1.5 frames

Control/remote

Serial control ports	
Enclosure	1 bidirectional RS-232, 2.5 mm mini stereo jack (front panel)
PowerCage FOX boards	
Control	1 bidirectional RS-232, 3.5 mm captive screw connector, 5 pole (uses 3 poles; shared with the alarm port)
Pass-through	1 RS-232, 3.5 mm captive screw connector, 5 pole (3 pins are used, "RS-232 Over Fiber")
Baud rate and protocol	
PowerCage FOX boards	
Control	9600 baud, 8 data bits, 1 stop bit, no parity
Pass-through	9600 to 115,200 baud
Serial control pin configurations	
Captive screw connector	1 = Tx, 2 = Rx, 3 = GND
Mini stereo jack	RS-232: tip = Tx, ring = Rx, sleeve = GND
Program control	Extron control/configuration program for Windows® Extron Simple Instruction Set (SIS™)

General

Power consumption*	1 or 2* (positive-negative), 100 VAC to 240 VAC, 50-60 Hz; internal, hot-swappable *A redundant power supply is optional.
System	Enclosure without boards: 12.4 watts at 115 VAC, 60 Hz
Each FOX board at 115 VAC, 60 Hz	FOX Tx VGA: 5.68 watts FOX Rx VGA: 6.54 watts FOX Tx DVI: 5.67 watts FOX Rx DVI: 5.50 watts FOX 3G HD-SDI: 1.84 watts FOX Tx AV: 6.89 watts FOX Rx AV: 5.57 watts
Power input requirements for boards.	12 VDC, 1.0 A, supplied by the PowerCage enclosure
Temperature/humidity	Storage: -40 to +158 °F (-40 to +70 °C) / 10% to 90%, noncondensing Operating: +32 to +122 °F (0 to +50 °C) / 10% to 90%, noncondensing
Cooling	Enclosure: fans, front to back Boards: convection, within the PowerCage enclosure
Mounting — PowerCage enclosure	
Rack mount	Yes
Enclosure type	Metal
Enclosure dimensions	
PowerCage enclosure	5.25" H x 17.0" W x 12.25" D (3U high, full rack wide) 13.3 cm H x 43.2 cm W x 31.2 cm D (Depth excludes connectors on the optional boards. Width excludes rack ears.)
PowerCage FOX boards	Fits a double slot opening in a PowerCage enclosure.
Product weight	
PowerCage enclosure	11.6 lbs (5.3 kg)
PowerCage FOX boards	1.1 lbs (0.5 kg)
Shipping weight	
PowerCage enclosure	13 lbs (6 kg)
Boards	2 lbs (1 kg) each
Vibration	ISTA 1A in carton (International Safe Transit Association)
Regulatory compliance	
Safety	CE, c-UL, FDA Class 1, UL
EMI/EMC	CE, C-tick, FCC Class A, ICES, VCCI
MTBF	30,000 hours
Warranty	3 years parts and labor

NOTE: All nominal levels are at ±10%.

NOTE: Specifications are subject to change without notice.

Part Numbers

PowerCage FOX part numbers

The PowerCage FOX units must be installed in a PowerCage 1600 enclosure. The units are available in singlemode (SM) and multimode (MM) models:

PowerCage Enclosure and Boards	Part number
PowerCage 1600 Enclosure	60-978-01

PowerCage FOX Tx VGA SM	70-699-12
PowerCage FOX Rx VGA SM	70-699-22
PowerCage FOX Tx VGA MM	70-699-11
PowerCage FOX Rx VGA MM	70-699-21

PowerCage FOX Tx DVI SM	70-700-12
PowerCage FOX Rx DVI SM	70-700-22
PowerCage FOX Tx DVI Plus SM	70-873-12
PowerCage FOX Rx DVI Plus SM	70-873-22
PowerCage FOX Tx DVI MM	70-700-11
PowerCage FOX Rx DVI MM	70-700-21
PowerCage FOX Tx DVI Plus MM	70-873-11
PowerCage FOX Rx DVI Plus MM	70-873-21

Included parts

These items are included in each order for a PowerCage FOX Tx/Rx:

Included parts	Part number
IEC power cord	
Tweeker (small screwdriver)	
Setup guide	
Captive screw 5-pole connectors (qty. 6)	10-703-12
(2) 10′ LC-LC duplex patch cables (SM or MM, depending on the model)	

Cables

Accessory	Part number
VGA M-M MD, 3' to 100' (0.9 m to 30.4 m) (molded)	26-238-*nn*
VGA M-M BK, 3' to 100' (0.9 m to 30.4 m) (backshell)	26-238-*nn*
VGAP M-M MD, 3' to 25' (0.9 m to 7.6 m) (molded) (plenum)	26-439-*nn*
VGAP M-M BK, 35' to 100' (10.6 m to 30.4 m) (backshell) (plenum)	26-439-*nn*
VGA-A M-M MD (with audio), 3' to 50' (0.9 m to 15.2 m) (molded)	26-490-*nn*
VGA-A M-M BK (with audio), 3' to 50' (0.9 m to 15.2 m) (backshell)	26-490-*nn*

DVID SL Pro Series DVI-D male-to-male cable	26-649-*nn*
HDMI M-M Pro Series HDMI male to male cable	26-650-*nn*
HDMI M-DVI-D M/6 HDMI male to DVI-D male, 6' (1.8 m)	26-614-02

Adapters

Accessories	Part number
HDMIF-DVIDM HDMI female to DVI-D male adapter	26-616-01
HDMIM-DVIDF HDMI male to DVI-D female adapter	26-617-01

Installing a Board in the Enclosure

Up to 16 single slot or 8 dual slot input/output boards can be inserted into the PowerCage enclosure. The PowerCage transmitters and receivers are all dual slot boards.

NOTE: The boards are hot-swappable, and can be installed or removed without disconnecting power to the PowerCage enclosure.

Use ESD precautions when installing a board to avoid damaging the board. Keep the board in the anti-static bag until needed. Use proper grounding techniques during installation.

1. Ensure power is removed from the PowerCage enclosure.
2. Position the board in the slot so that the power and communication ports on the front end of the board are aligned with the matching ports inside of the board cage (see figure 27).

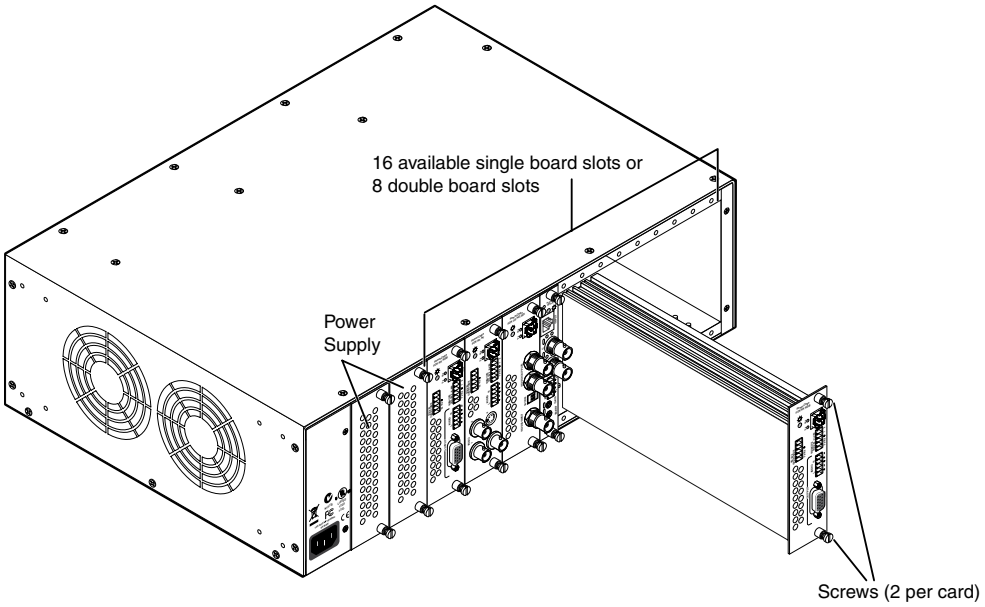


Figure 27. Inserting Boards into the PowerCage 1600 Enclosure

3. Carefully slide the board into the slot and push the board firmly into place.
4. Use a screwdriver to tighten the 2 screws to secure the board into place.
5. Repeat steps **2** to **4** for all boards needing installation.

NOTE: Ensure the boards are flush with the rear of the enclosure and the screws tightened securely before applying power.

Extron® Warranty

Extron Electronics warrants this product against defects in materials and workmanship for a period of three years from the date of purchase. In the event of malfunction during the warranty period attributable directly to faulty workmanship and/or materials, Extron Electronics will, at its option, repair or replace said products or components, to whatever extent it shall deem necessary to restore said product to proper operating condition, provided that it is returned within the warranty period, with proof of purchase and description of malfunction to:

USA, Canada, South America, and Central America:
Extron Electronics
1001 East Ball Road
Anaheim, CA 92805
U.S.A.

Japan:
Extron Electronics, Japan
Kyodo Building, 16 Ichibancho
Chiyoda-ku, Tokyo 102-0082
Japan

Europe, Africa, and the Middle East:
Extron Europe
Hanzeboulevard 10
3825 PH Amersfoort
The Netherlands

China:
Extron China
686 Ronghua Road
Songjiang District
Shanghai 201611
China

Asia:
Extron Asia
135 Joo Seng Road, #04-01
PM Industrial Bldg.
Singapore 368363
Singapore

Middle East:
Extron Middle East
Dubai Airport Free Zone
F12, PO Box 293666
United Arab Emirates, Dubai

This Limited Warranty does not apply if the fault has been caused by misuse, improper handling care, electrical or mechanical abuse, abnormal operating conditions, or if modifications were made to the product that were not authorized by Extron.

NOTE: If a product is defective, please call Extron and ask for an Application Engineer to receive an RA (Return Authorization) number. This will begin the repair process.

USA: (714) 491-1500 **Europe**: +31.33.453.4040
Asia: +65.6383.4400 **Japan**: +81.3.3511.7655

Units must be returned insured, with shipping charges prepaid. If not insured, you assume the risk of loss or damage during shipment. Returned units must include the serial number and a description of the problem, as well as the name of the person to contact in case there are any questions.

Extron Electronics makes no further warranties either expressed or implied with respect to the product and its quality, performance, merchantability, or fitness for any particular use. In no event will Extron Electronics be liable for direct, indirect, or consequential damages resulting from any defect in this product even if Extron Electronics has been advised of such damage.

Please note that laws vary from state to state and country to country, and that some provisions of this warranty may not apply to you.

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